

# SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1963

No. 204

UNITED STATES, APPELLANT,

vs.

ALUMINUM COMPANY OF AMERICA, ET AL.

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE  
NORTHERN DISTRICT OF NEW YORK

Volume III

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## Exhibit A

## Plan and Agreement

This Agreement is made by Aluminum Company of America, a Pennsylvania corporation (herein called Alcoa), and Rome Cable Corporation, a New York corporation (herein called Rome).

Alcoa desires to acquire, through a wholly-owned subsidiary of Alcoa (herein called the Subsidiary), and Rome desires to transfer, all of the assets, properties, contract rights, business and good will of Rome in exchange solely for shares of common stock of Alcoa and the assumption by the Subsidiary of all debts, obligations, liabilities and contract duties of Rome.

Rome desires to provide for the winding up and settling of its affairs in voluntary dissolution and for the distribution of the common stock of Alcoa thus to be acquired by Rome to the shareholders of Rome in complete liquidation and cancellation of the common stock of Rome.

To provide for the consummation of the foregoing objectives, Alcoa and Rome agree as follows:

## Article I

## Representations and Warranties

Section 1.1. *Representations and Warranties of Rome.*

Rome represents and warrants to Alcoa that:

A. Rome is a corporation duly organized and existing and in good standing under the laws of the State of New York and has power and authority (i) to own or lease its properties and to operate them in the places where such properties are now owned, leased or operated and (ii) to carry on its business in the manner in which such business is now conducted. Rome has no subsidiaries.

B. As of December 31, 1958, the authorized capital stock of Rome consisted of 1,200,000 shares of common stock of the par value of \$5.00 per share, of which 591,802 shares had been issued, 557,602 shares of which were then outstanding and 34,200 shares of which were then held in

Rome's treasury. As of December 31, 1958, options had been granted to employees of Rome and were outstanding to purchase an aggregate of 34,440 shares at a price of \$25.57 per share.

C. Rome has delivered to Alcoa: (i) balance sheets of Rome as of March 31 for each of the years 1956, 1957 and 1958, together with operating statements and analyses of capital invested for the fiscal years ended with such dates, all certified by Ernst & Ernst, independent public accountants, and (ii) a balance sheet of Rome as of December 31, 1958 and an operating statement and analysis of capital invested for the nine-month period ended December 31, 1958, which are unaudited. All such financial statements for the fiscal years ending March 31, 1956, 1957 and 1958 have been prepared in conformity with generally accepted accounting principles applied on a consistent basis throughout the periods covered thereby, and fairly present the financial condition of Rome at the respective dates and the results of operations of Rome for the indicated periods. The balance sheet of Rome as of December 31, 1958 and the operating statement and analysis of capital invested for the nine-month period then ended have been prepared in conformity with the accounting principles regularly employed by Rome in the preparation of its interim statements and are subject to audit and fiscal year-end adjustments.

D. Rome had no liabilities at March 31, 1958 which are not shown or provided for on the balance sheet of Rome as of March 31, 1958 except such as may arise out of contract obligations and other commitments theretofore incurred or made in the ordinary course of business.

E. Rome has not, since March 31, 1958:

(i) entered into any transactions other than in the ordinary course of business;

(ii) paid any dividends or made any other distributions to its shareholders except dividends of 25¢ per share paid on July 1, 1958, October 1, 1958, and January 3, 1959, and of 25¢ per share to be paid on or about March 18, 1959 to shareholders of record on or about February 27, 1959;

[fol. 4556] (iii) issued or sold, or granted any op-

tions to buy, or agreed to issue or sell, or to grant any options to buy, any stocks, bonds or other corporate securities except shares of common stock issued or sold pursuant to stock options outstanding on December 31, 1958;

(iv) incurred or agreed to incur any liability or obligation except current liabilities and obligations entered into in the ordinary course of business;

(v) mortgaged, pledged or subjected to any lien, charge or other encumbrance any of its assets, tangible or intangible;

(vi) sold or transferred any of its tangible assets or canceled any debts or claims except in the ordinary course of business;

(vii) sold, assigned or transferred any patents, trademarks, trade names, copyrights or other intangible assets;

(viii) suffered any extraordinary losses or waived any rights or claims having more than nominal value.

F. Rome has filed all federal, state and local tax returns required to be filed and has paid all taxes shown by such returns to be due and payable. The Internal Revenue Service has audited the federal income and excess profits tax returns filed by Rome for all fiscal years through the fiscal year ending in 1954 and has claimed no deficiencies with respect to such years which have not been paid. No state or local taxing authority has asserted any tax deficiency which has not been paid or for the payment of which adequate provision has not been made.

G. There are no actions, suits or proceedings pending or, to the knowledge of Rome, threatened against or affecting Rome which are material to its business, properties or financial condition. Rome is not in default with respect to any judgment, order, writ, injunction, decree, assessment or other similar command of any court or of any federal, state, municipal or other governmental department, commission, board, bureau, agency or instrumentality.

H. Rome has good and marketable title in fee simple to all real properties and improvements thereon included in its assets as shown in its said balance sheet as of March

31, 1958, and to such real properties and improvements thereon as have been acquired or made since that date, subject only to the lien of current state and local property taxes and assessments, payment whereof is not delinquent, and to minor restrictions, covenants, easements, rights and licenses of record which do not impair the use of such property for the business of Rome. Rome owns outright, free and clear of all liens and encumbrances, all machinery, equipment, inventories and other personal property reflected in its balance sheet as of March 31, 1958, and all machinery, equipment, inventories and other personal property acquired by it since March 31, 1958, except such as it has disposed of since that date in the ordinary course of business.

I. The execution and delivery of this Agreement and the consummation of the transactions contemplated hereby will not result in any breach or violation of, or default under, any agreement or other instrument to which Rome is a party or by which it is bound, except that (i) if the consent of J. P. Morgan & Co. Incorporated, The Connecticut Mutual Life Insurance Company and Massachusetts Mutual Life Insurance Company, or other holder or holders of Rome's promissory notes issued in connection with a borrowing by Rome in 1957 of \$5,000,000, shall not be secured, the consummation of the transactions contemplated hereby may constitute a default under said promissory notes, and, (ii) if Rome has any claims, contracts, leases, licenses, rights or obligations which are not by their terms or by law assignable without the consent of any other party thereto, then the consummation of the transactions contemplated hereby may constitute a default thereunder.

J. Rome has not agreed, or become liable, to pay any fee or commission in the nature of a finder's or originator's fee in connection with the subject matter of this Agreement.

K. There have been no changes in the condition of Rome, financial or otherwise, as shown in its said balance sheet as of March 31, 1958, other than changes which occurred in the ordinary course of business, and none of [fol. 4557] such changes (other than as reflected in Rome's balance sheet as of December 31, 1958) had a



material adverse effect on Rome's financial condition, results of its operations or its properties.

**Section 1.2. *Representations and Warranties of Alcoa.***

Alcoa represents and warrants to Rome that:

A. Alcoa is a corporation duly organized and existing and in good standing under the laws of the Commonwealth of Pennsylvania.

B. As of February 6, 1959, the authorized capital stock of Alcoa consisted of: (i) 1,000,000 shares of serial preferred stock of the par value of \$100.00 per share, of which 660,000 shares of a series designated "\$3.75 Cumulative Preferred Stock" had been authorized, 659,909 shares of which had been issued and were then outstanding; and (ii) 50,000,000 shares of common stock of the par value of \$1.00 per share of which 20,655,992 shares had been issued and were then outstanding. As of February 6, 1959 options had been granted to employees of Alcoa and were outstanding to purchase the following numbers of shares of common stock at the following prices: 60,628 shares at \$17.6875 per share, 77,095 shares at \$29.3750 per share, 150 shares at \$117.25 per share, and 187,151 shares at \$68.50 per share.

C. Alcoa has delivered to Rome a consolidated balance sheet of Alcoa as of December 31, 1958, together with a statement of consolidated income and retained earnings and a statement of consolidated additional capital for the year ended December 31, 1958, all certified by Lybrand, Ross Bros. & Montgomery, independent public accountants. Such statements have been prepared in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year, and fairly present the financial condition of Alcoa as of December 31, 1958 and the results of operations of Alcoa for the year ended December 31, 1958.

D. There have been no changes in the condition of Alcoa, financial or otherwise, as shown in its said balance sheet as of December 31, 1958, other than (i) changes which occurred in the ordinary course of business and (ii) changes which occurred outside the ordinary course of business but did not have a material adverse effect on



Alcoa's financial condition, results of its operations or its properties.

## Article II

### Covenants

#### Section 2.1. *Negative Covenants of Rome.*

From and after the date of this Agreement and until the Closing Date, Rome shall not:

A. Grant any general increases in rates of pay to its hourly paid employees except increases resulting from existing contracts with labor unions, or grant any material increase in the salaries of any other employees or make any material increase in other benefits to which employees may be entitled.

B. Amend its Certificate of Incorporation or its by-laws except to change its name.

#### Section 2.2. *Affirmative Covenants of Rome.*

A. Forthwith upon the execution and delivery of this Agreement, Rome shall:

(i) Deliver to Alcoa a true and complete list of all real properties owned by or leased to Rome as of the date of this Agreement, and supplement the same with a list or lists of real properties thereafter acquired or leased, including in such list or lists all plants, structures and other improvements on such real properties, together with a statement as of March 31, 1958 (or as of any later date of acquisition) of the gross book value, book reserve for depreciation, net book value, basis of valuation, and depreciation and amortization policy with respect thereto.

(ii) Deliver to Alcoa a true and complete list and brief description of all patents, patent applications, trademark registrations and copyrights owned by Rome or in which it has any rights as of the date of this Agreement, together with a brief description of the nature of such rights, and supplement the same with a list or lists of such property or rights thereafter acquired, provided that Alcoa shall accord confidential treatment to the content of patent applications so revealed.

(iii) Deliver to Alcoa a true and complete list, and make available for inspection by Alcoa a true copy, of the following described contracts and other instruments to which Rome is or shall be a party or by which it is or shall be bound:

(a) All employment contracts and collective bargaining or other labor agreements;

(b) All pension, retirement, stock option, profit-sharing, group insurance or other incentive or welfare contracts and all trust agreements relating thereto;

(c) All contracts for the purchase of any materials, supplies or equipment or for the sale of Rome's products which extend beyond December 31, 1959;

(d) All leases of any property, real or personal, with respect to which Rome is either lessor or lessee;

(e) All notes and agreements relating to any indebtedness of Rome which matures after March 31, 1959;

(f) All other contracts not made in the ordinary course of business.

(iv) Deliver to Alcoa a true and complete list and brief description of all policies of fire, liability and other forms of insurance held by Rome, and maintain and keep such insurance in full force and effect.

(v) Call a special meeting of its shareholders to be held on March 25, 1959 (or other date acceptable to Alcoa), for the purpose of considering and approving this Agreement and authorizing the consummation of the transactions contemplated hereby.

B. From and after the date of this Agreement and until the Closing Date, Rome shall:

(i) Carry on its business in substantially the same manner as heretofore and not make any purchase or sale or introduce any method of management or operation in respect of its business or properties except in a manner consistent with its prior practices.

(ii) Use its best efforts to maintain and preserve its business organization intact, to retain its present employees and to maintain its relationships with its customers and others.

(iii) Permit Alcoa and its authorized representatives to have full access to all properties, records and documents of Rome and furnish to Alcoa such financial and other information with respect to the business and properties of Rome as Alcoa may from time to time reasonably request; provided, however, that any furnishing by Rome of such information to Alcoa or any making by Alcoa of such investigation shall not affect the right of Alcoa to rely upon the representations and warranties of Rome, and provided further that Alcoa shall use its best efforts to keep all such information confidential but shall be under no liability for any disclosure which may occur in spite of such best efforts.

C. At or after the Closing Date, Rome shall:

(i) Take such action as shall be necessary to effect the termination of Rome's profit-sharing plan for employees and the distribution of assets held in trust thereunder.

(ii) Take such action with respect to all pension, retirement, stock option, group insurance or other incentive or welfare plans of Rome as Alcoa shall reasonably direct.

### Section 2.3. *Covenants of Alcoa.*

From and after the date of this Agreement and until the Closing Date, Alcoa:

A. Shall not subdivide or otherwise reclassify its capital stock.

B. Shall not issue any additional capital stock except such as may be issued pursuant to the exercise of stock options outstanding on February 6, 1959 and except such as may be issued under the Alcoa Sayings Plan for Salaried Employees.

[fol. 4559] C. Shall take such corporate action as shall be necessary to carry out the transactions contemplated hereby and shall cause the Subsidiary to be incorporated and to be registered to do business in states where such registration shall be deemed necessary.

## Article III

### Conditions

#### Section 3.1. *Conditions of Alcoa's Obligations.*

The obligations of Alcoa under this Agreement are subject to the satisfaction of the following conditions:

A. All representations and warranties of Rome contained in this Agreement shall be true and correct on and as of the Closing Date, with the same force and effect as though such representations and warranties had been made on and as of the Closing Date, except as to transactions contemplated herein and changes which occurred in the ordinary course of business after the date hereof and did not have a material adverse effect on the operation, properties or financial condition of Rome.

B. Rome shall have delivered to Alcoa a certificate, dated as of the Closing Date and signed by the President or a Vice President and by the Comptroller or Assistant Comptroller of Rome, stated to be to the best of their knowledge and belief, to the effect stated in clause A of this Section 3.1.

C. Rome shall have fully complied with all covenants stated in Sections 2.1 and 2.2 hereof.

D. Rome shall have used its best efforts, (i) to have secured the consent of J. P. Morgan & Co. Incorporated, The Connecticut Mutual Life Insurance Company and Massachusetts Mutual Life Insurance Company, or other holder or holders of Rome's promissory notes issued in connection with a borrowing by Rome in 1957 of \$5,000,000, to the transactions contemplated by this Agreement, and (ii) to provide for Alcoa or the subsidiary the benefits of such claims, contracts, licenses, leases or rights as may be non-assignable, including enforcement, not at the cost of Rome, of any and all rights of Rome against the other party thereto.

E. The holders of at least two-thirds of the issued and outstanding shares of common stock of Rome entitled to vote thereon shall have voted in favor of this Agreement and of the consummation of the transactions contemplated herein.



F. Alcoa shall have received from Messrs. Ferris, Hughes, Dorrance and Groben, or other counsel for Rome satisfactory to Alcoa, an opinion, in form and substance satisfactory to Alcoa and dated the Closing Date, to the effect that:

(i) Rome is a corporation duly organized and existing and in good standing under the laws of the State of New York and has power and authority (a) to own or lease its properties and to operate them in the places where such properties are then owned, leased or operated and (b) to carry on its business in the manner in which such business is then conducted;

(ii) Rome has full power and authority to convey, assign, transfer and deliver the assets of Rome as herein provided;

(iii) All corporate and other proceedings required to be taken by or on the part of Rome to authorize it to carry out this Agreement and to convey, assign, transfer and deliver the assets of Rome as herein provided have been duly and properly taken;

(iv) The title of Rome in and to its real properties is a good and marketable title in fee simple, free and clear of all mortgages, liens, charges or encumbrances of any nature except the lien of current state and local property taxes and assessments, payment whereof is not delinquent, and except as to minor restrictions, covenants, easements, rights and licenses of record which do not impair the use of such property for the business of Rome, and that Rome has good title to the property and assets of Rome other than real property;

(v) The instruments of transfer and conveyance tendered to the Subsidiary are sufficient to vest in the Subsidiary such title to all of the assets of Rome as a going concern as was vested in Rome immediately prior to the delivery thereof;

and to such other effect as Alcoa may reasonably require. [fol. 4560] G. Alcoa shall have received a letter from Ernst & Ernst, dated the Closing Date, stating in effect that on the basis of a limited review (but not an audit or "examination" as used in accountants' certificates) of the financial statements of Rome for the period subsequent to



March 31, 1958, consultations with officers of Rome responsible for financial and accounting matters and other specified procedures and inquiries they have no reason to believe that:

(i) The statement of financial condition of Rome as of March 31, 1956, 1957 and 1958 and the operating statement and analysis of capital invested for the fiscal years ended with such dates (on which they have previously reported) do not now fairly present the financial condition of Rome at the respective dates, and the results of operations of Rome for the indicated periods and were not prepared in accordance with generally accepted accounting principles applied on a consistent basis.

(ii) There has been any material change in the accounting principles followed by Rome since March 31, 1958, and

(iii) Except as set forth or contemplated in this Agreement, during the period from March 31, 1958 to a date not more than five days prior to the Closing Date there was any change in the issued capital stock or funded debt of Rome other than payment in accordance with the terms thereof, or any material change in the financial position other than in the ordinary course of business or that Rome entered into any material financial transactions not in the ordinary course of business.

### Section 3.2. *Conditions of Rome's Obligations.*

The obligations of Rome under this Agreement are subject to the satisfaction of the following conditions:

A. All representations and warranties of Alcoa contained in this Agreement shall be true and correct on and as of the Closing Date with the same force and effect as though such representations and warranties had been made on and as of the Closing Date, except as to transactions contemplated herein and (i) changes which occurred in the ordinary course of business after the date hereof and (ii) changes which occurred outside the ordinary course of business after the date hereof but did not have a material adverse effect on the operations, properties or financial condition of Alcoa.

B. Alcoa shall have delivered to Rome a certificate, dated as of the Closing Date and signed by the President or a Vice President and the Controller or Assistant Controller of Alcoa, stated to be to the best of their knowledge and belief, to the effect stated in clause A of this Section 3.2.

C. Alcoa shall have fully complied with all covenants stated in Section 2.3 hereof.

D. Rome shall have received from the Internal Revenue Service a ruling, in form and substance satisfactory to Rome, with respect to the federal income tax consequences of the transactions contemplated hereby.

E. The holders of at least two-thirds of the issued and outstanding shares of common stock of Rome entitled to vote thereon shall have voted in favor of this Agreement and of the transactions contemplated herein.

F. There shall not have been objection to the transfer of Rome's assets and demand for payment of the value of their shares of Rome common stock as provided in Sections 20 and 21 of the New York Stock Corporation Law by the holders of more than 10% of the issued and outstanding shares of common stock of Rome.

G. Rome shall have received from the General Counsel of Alcoa an opinion, in form and substance satisfactory to Rome and dated the Closing Date, to the effect that:

(i) Alcoa is a corporation duly organized and existing and in good standing under the laws of the Commonwealth of Pennsylvania;

(ii) All corporate and other proceedings required to be taken by or on the part of Alcoa to authorize it to carry out this Agreement and to issue and deliver the shares of common stock of Alcoa, deliverable pursuant hereto, have been duly and properly taken;

(iii) Said shares of common stock of Alcoa will, on delivery thereof to Rome, in accordance with the terms hereof, be duly and validly issued, fully paid and non-assessable, that registration of the said shares under [fol. 4561] the Securities Act of 1933 is not required (or if required has been duly accomplished), and that the said shares have been duly listed on the New York Stock Exchange.

## Article IV

### Consummation of Transactions

#### Section 4.1. *Transfer of Rome's Assets.*

On the Closing Date Rome shall convey, assign, transfer and deliver to the Subsidiary all assets, properties, contract rights, business and good will of Rome of every kind and description and wherever located as the same shall exist on the Closing Date (herein sometimes collectively called assets of Rome) except such amounts of cash or other assets as may be retained pursuant to Section 4.6 hereof and except the minute books and stock books of Rome and any records required by law to be retained by Rome, provided that within a reasonable time after the dissolution of Rome, Rome shall, unless otherwise required by law, deliver to Alcoa or to the Subsidiary, as Alcoa shall direct, the minute books, stock books and all other records of Rome. The transfer shall be effected by such instruments as Alcoa shall reasonably request. Rome shall from time to time as the same is received by it after the Closing Date, pay over to the Subsidiary all cash received by Rome from the exercise by its employees of options to purchase common stock of Rome.

#### Section 4.2. *Assumption of Rome's Liabilities.*

On the Closing Date Alcoa shall cause the Subsidiary to assume and agree to pay, perform and discharge all debts, obligations, liabilities and contract duties of Rome as the same shall exist on the Closing Date, except expenses for the payment of which Rome shall retain cash or other assets as provided in Section 4.6 hereof. The Subsidiary shall execute such instruments as Rome shall reasonably request. Notwithstanding any other provision of this Agreement and except as otherwise specifically provided in this Article IV, neither Alcoa nor the Subsidiary shall assume any obligation of Rome with respect to options granted by Rome to its employees to purchase common stock of Rome.

#### Section 4.3. *Transfer of Alcoa Stock.*

On the Closing Date Alcoa shall cause the Subsidiary to transfer to Rome such number of shares of common stock of Alcoa, not to exceed 355,226 shares, as shall be equal to

6/10 (rounded off to the next higher full share) of the aggregate number of shares of common stock of Rome which are issued and outstanding on the Closing Date (exclusive of any shares held in the treasury of Rome) and with respect to which any unexercised stock option granted by Rome to its employees prior to December 31, 1958 shall be outstanding. Alcoa shall take all such action as it may and as shall be required to cause the said shares of common stock of Alcoa to be listed on the New York Stock Exchange on the Closing Date.

#### Section 4.4. *Dissolution of Rome.*

On or as promptly as practicable after the Closing Date Rome shall take such steps as may be required under the laws of New York to dissolve and terminate its corporate existence and shall distribute to its shareholders, against surrender of and in exchange for their respective certificates for shares of common stock of Rome, certificates for shares of common stock of Alcoa at the rate of 6/10 of one share of common stock of Alcoa for each issued and outstanding share of common stock of Rome. Such distribution shall be effected by depositing with Guaranty Trust Company of New York (herein called the Trust Company), as depository for the shareholders of Rome, all the shares of common stock of Alcoa received hereunder, and the Trust Company, upon receipt of certificates for shares of common stock of Rome, shall deliver to or upon the order of the respective owners of such Rome shares, certificates for the number of whole shares of common stock of Alcoa to which such owners are entitled, together with any dividends which the Trust Company as such depository shall have received subsequent to the Closing Date with respect to such shares so held by it. Certificates for fractional shares of common stock of Alcoa shall not be issued in connection with such exchange. In lieu thereof Rome and Alcoa shall take appropriate action to permit, for a period of 120 days after the Closing Date (the date of expiration of said period being herein call the Expiration Date), the purchase and sale of fractional interests in shares of common stock of Alcoa by Rome shareholders [fol. 4562] who, except for the preceding sentence, would have been entitled to certificates for fractional shares of common stock of Alcoa. At such time or times after the



Expiration Date as the Trust Company shall reasonably determine, the Trust Company, acting as agent for each shareholder of Rome who is, according to the stock transfer books and records of Rome as of the close of business on the Expiration Date, entitled to a fractional interest in any share of Alcoa common stock, shall sell the share or shares representing the aggregate of such fractional interests and shall remit to each such shareholder his proportionate interest in the net proceeds of such sale against surrender by such shareholder of his certificate or certificates representing shares of common stock of Rome.

*Section 4.5. Re-Transfer of Alcoa Shares in Certain Cases.*

If, any shareholder of Rome shall have objected to the transfer of Rome's assets and shall have demanded the payment of the value of his shares of Rome common stock pursuant to the applicable provisions of the laws of New York, the shares of common stock of Alcoa to which such shareholder of Rome would otherwise have been entitled shall not be distributed to such shareholder of Rome. After such shareholder of Rome shall have received payment of the value of his shares of Rome common stock and shall have transferred such shares to Rome, Alcoa or the Subsidiary, as Alcoa shall direct, shall be entitled to the shares of common stock of Alcoa, including a fractional interest in any share, to which such shareholder would otherwise have been entitled. From time to time thereafter, upon surrender of Rome certificates, and as requested by Alcoa, the Trust Company shall deliver to Alcoa or the Subsidiary the certificate or certificates for such shares of Alcoa common stock and shall also pay Alcoa or the Subsidiary any dividends which the Trust Company shall have received with respect to such shares. If any employee of Rome holding an option to purchase common stock of Rome granted by Rome prior to December 31, 1958 shall fail to exercise the same in full within three months after the Closing Date, the shares of common stock of Alcoa to which such employee would have been entitled upon exchange for shares of common stock of Rome which he would have acquired had he exercised the said option in full shall not be delivered to him, and from time to time thereafter, as requested by Alcoa, the Trust Company shall deliver to Alcoa or the Subsidiary the cer-



tificate or certificates for such shares of Alcoa common stock and shall also pay Alcoa or the Subsidiary any dividends which the Trust Company shall have received with respect to such shares. Whenever, after December 31, 1962, Alcoa shall so request the Trust Company shall deliver and pay to Alcoa or to the Subsidiary certificates for any and all shares of common stock of Alcoa not theretofore transferred to shareholders of Rome in exchange for certificates for common stock of Rome, and the net proceeds of the sale of shares in which there are fractional interests, together with all dividend monies received by the Trust Company with respect to such shares. Thereafter the holders of such shares of common stock of Rome shall, if and to the extent that they shall have any rights thereto, look only to Alcoa or the Subsidiary, as the case may be, for delivery of certificates for such full shares of Alcoa common stock, payment of their proportionate interests in such net proceeds of the sale of shares in which there were fractional interests and payment of such dividend monies allocable thereto upon surrender of their shares of Rome common stock for exchange.

**Section 4.6. *Retention of Cash or other Assets by Rome.***

Rome shall retain in a separate fund cash or other assets or both in such amount as Rome shall reasonably deem sufficient to enable Rome to pay all expenses incurred or to be incurred by Rome in carrying out this Agreement and not paid by Rome prior to the Closing Date. Such expenses shall include but not be limited to payments to shareholders of Rome who object to the transfer of the assets of Rome and demand payment for their shares of Rome stock and any expenses incurred in connection with any proceedings to fix the value of Rome stock for such purpose. Any balance remaining in such fund after all such expenses shall be paid or adequately provided for shall be paid over and transferred to the Subsidiary.

**Section 4.7. *Alternate Provision Concerning Rome Stock Options.***

A. The provisions of paragraph B of this Section 4.7 may, by mutual agreement of Alcoa and Rome, be applied in lieu of the provisions elsewhere made in this Article IV (except

in Section 4.2) with respect to options granted by Rome to its employees to purchase common stock of Rome. In the event that the provisions of paragraph B of this Section 4.7 are applied, shares of common stock of Rome with respect to which any unexercised stock option shall be outstanding on the Closing Date shall not be included in the aggregate [fol. 4563] number of shares of common stock of Rome referred to in Section 4.3 for the purpose of determining the number of shares of common stock of Alcoa to be delivered under the provisions of Section 4.3.

B. Alcoa shall assume each option granted by Rome to its employees prior to December 31, 1958 to purchase common stock of Rome which has not been fully exercised on or prior to the Closing Date, to the end that by exercise of each such option the optionee may, for the price of \$25.57 and under the terms of said option, purchase 6/10ths of one share of Alcoa common stock for each share of common stock of Rome with respect to which such option might have been but was not exercised as of the Closing Date, provided that the number of shares of Alcoa common stock that may be purchased under any such option shall not include any fractional share but shall be rounded off to the next lower full share.

#### Section 4.8. *Further Assurances.*

At any time and from time to time after the Closing Date, upon the request of Alcoa, Rome will do, execute, acknowledge and deliver or will cause to be done, executed, acknowledged and delivered, all such further acts, deeds, assignments, transfers, conveyances, powers of attorney and assurances as may be required for the better assigning, transferring, granting, conveying, assuring and confirming to the Subsidiary and its successors and assigns, or for aiding and assisting in collecting and reducing to possession, the assets of Rome to be assigned to the Subsidiary as herein provided.

### Article V

#### Miscellaneous

##### Section 5.1. *Closing Date.*

The Closing Date shall be March 31, 1959, provided that either Alcoa or Rome may, at any time and from time to

time, by written notice to the other, postpone the closing to a date not later than the close of business on April 30, 1959. Subject to the provisions of Section 5.8 hereof, Alcoa and Rome, by mutual consent, may postpone the closing date beyond April 30, 1959.

**Section 5.2. *Place of Closing.***

The consummation of the transactions contemplated by this Agreement shall take place at the office of Rome in Rome, New York, or at such other place as Rome and Alcoa shall mutually determine.

**Section 5.3. *Bulk Sales Laws.***

Alcoa hereby waives and will cause the Subsidiary to waive compliance by Rome with the provisions of any applicable bulk sales law.

**Section 5.4. *Election of Alcoa with respect to Subsidiary.***

The right is reserved to Alcoa to effect the acquisition of assets of Rome by the Subsidiary and the assumption of liabilities of Rome by the Subsidiary by the direct acquisition of the assets of Rome by Alcoa from Rome in exchange for shares of common stock of Alcoa and the assumption of liabilities of Rome by Alcoa, and the subsequent transfer of all or less than all of said assets by Alcoa to the Subsidiary in exchange for capital stock of the Subsidiary and the assumption by the Subsidiary of all or less than all of said liabilities.

**Section 5.5 *Name of the Subsidiary.***

Rome consents to the use of the name "Rome Cable Corporation" by the Subsidiary or to the use of the word "Rome" in any other manner in the corporate name of the Subsidiary. Rome shall cooperate fully with Alcoa and the Subsidiary in connection with the incorporation of the Subsidiary and the registration thereof to do business in states where such registration is deemed necessary.

[fol. 4564] **Section 5.6. *Notices.***

All notices or other communications required or permitted to be given hereunder shall be in writing and shall be sufficiently given to Alcoa if delivered personally to its President or if sent by registered or certified mail, addressed to:

Aluminum Company of America  
 1501 Alcoa Building  
 Pittsburgh 19, Pennsylvania  
 Attention of F. L. Magee, President

and to Rome if delivered personally to its President or if sent by registered or certified mail, addressed to:

Rome Cable Corporation  
 Rome, New York  
 Attention of A. D. Ross Fraser, President.

The designation of the person to be so notified or the address of such person may be changed from time to time by similar written notice.

#### Section 5.7. *Parties in Interest.*

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors and assigns but shall not be assignable by either party without the written consent of the other party. Nothing in this Agreement, express or implied, is intended or shall be construed to confer upon any person other than the parties hereto any right, remedy or claim under or by reason of this Agreement.

#### Section 5.8. *Integration, Modification and Termination.*

This Agreement is the entire agreement between the parties hereto with respect to the subject matter hereof. Alcoa and Rome, by the mutual consent of their respective Boards of Directors or Executive Committees, or officers authorized by such boards or committees, may amend or modify this Agreement by a written instrument executed by Alcoa and Rome, provided, however, that no such amendment or modification shall change the number of shares of common stock of Alcoa to be delivered to Rome hereunder or make any material change in the provisions of this Agreement relating to the transfer of Rome's assets to and the assumption of its liabilities by the Subsidiary and the distribution to Rome's shareholders of such shares of common stock of Alcoa against surrender by such shareholders for cancellation of their certificates for outstanding shares of common stock of Rome, or alter the right of the share-



holders of Rome to terminate this Agreement as hereinafter provided in this Section. Notwithstanding any other provision hereof, this Agreement may be terminated at any time by mutual consent of the Boards of Directors or the Executive Committees of Alcoa and Rome. If, by mutual consent of Alcoa and Rome, the period within which the closing may be held is extended beyond April 30, 1959, the shareholders of Rome may direct the termination of this Agreement by affirmative vote of holders of record of a majority of the outstanding shares of the corporation represented and voting at any annual meeting of shareholders of Rome held after December 31, 1959, if the closing shall not have been held prior to the date of such annual meeting. In the event of any such direction by the shareholders of Rome, this Agreement shall thereupon be terminated. In the event of such termination in either such manner neither party shall have any liability of any kind to the other party or to any shareholder of such other party with respect to any matter arising out of this Agreement.

**Section 5.9. Interpretation.**

This Agreement shall be construed in accordance with the laws of the Commonwealth of Pennsylvania. The titles of the articles and sections have been inserted as a matter of convenience of reference only and shall not control or affect the meaning or construction of this Agreement.

[fol. 4565] **Section 5.10. Counterparts.**

A separate counterpart of this Agreement may be executed by each of the parties and both such counterparts taken together shall constitute a single instrument.

The parties have executed this Agreement this 17th day of February, 1959.

Aluminum Company of America, By I. W. Wilson,  
Chairman of the Board.

Attest;

Alfred M. Hunt, Secretary.

Rome Cable Corporation, By A. D. R. Fraser, President.

Attest:

Gerard A. Weiss, Secretary.



[fol. 4566]

## Exhibit B.

## Stock Corporation Law of the State of New York

## Section 20

## Voluntary Sale

§ 20. Voluntary sale, lease or exchange of property, rights, privileges and franchises and rights of objecting stockholders.

A stock corporation, except as otherwise provided by law or by its certificate of incorporation or other certificate filed pursuant to law, may voluntarily sell, lease or exchange its property, rights, privileges and franchises, or any interest therein or any part thereof; provided, however, that if such sale, lease or exchange is not made in the regular course of business of the corporation and involves all or substantially all of its property, rights, privileges and franchises, or an integral part thereof essential to the conduct of the business of the corporation, such sale, lease or exchange shall not be made without the consent of either the holders of record of all of its outstanding shares entitled to vote thereon given in writing without a meeting or the holders of record of two-thirds of its outstanding shares entitled to vote thereon obtained at a meeting of the stockholders called pursuant to section forty-five. Franchises within the state may be sold only to a domestic corporation.

If the sale, lease or exchange may not be made without the consent of stockholders and such consent is obtained at a stockholders' meeting, any stockholder entitled to vote thereon and not voting in favor of such proposed sale, lease or exchange may at any time prior to the vote thereon—or if notice of the meeting was not mailed to him at least twenty days prior to the taking of such vote, then within twenty days after the mailing of such notice—object to such sale, lease or exchange and demand payment for his stock, and thereupon such stockholder or the corporation shall have the right, subject to the conditions and provisions of section twenty-one, to have such stock appraised and paid for as provided in said section. Such objection and demand must be in writing and filed with the corporation,

The provisions of this section shall not apply to a railroad corporation.

### Section 21

#### Appraisal of Stock of Objecting Stockholder

§ 21. *Determination of value of stock of objecting stockholder.* 1. In the event that the stockholders of a corporation have taken action pursuant to sections fourteen, twenty, eighty-five, eighty-six or ninety-one or pursuant to article four and if any stockholder has objected to such action and demanded payment for his stock as provided in section fourteen, section twenty, subdivision seven of section eighty-five, section eighty-seven, section ninety-one or subdivision eleven of section thirty-eight, as the case may be, the corporation, within ten days after the last day on which a demand for payment might have been made, shall mail by registered mail to such objecting stockholder or deliver personally to him a written offer to pay for such stock in cash at a price deemed by the corporation to be the value thereof: and an offer so made to any such objecting stockholder shall also be made on the same terms and conditions and at the same price per share to all such objecting holders of shares of the same class of stock. If mailed, such offer shall be directed to such stockholder at his address as it appears on the stock-book unless he shall have filed with the secretary of the corporation a written request that notices intended for him be mailed to some other address, in which case it shall be mailed to the address designated in such notice. Such offer shall be accompanied by a balance sheet of the corporation as of a date not more than six months prior to the making of such offer and a profit and loss statement for the twelve months' period ended on the date of such balance sheet; provided, that if it is impracticable to furnish a balance sheet as of a date within such six months' period, a balance sheet as of such earlier date as shall be practicable, but not earlier than the end of the corporation's preceding fiscal year, shall be furnished, in which event the profit and loss statement shall be for the twelve months' period ended on the date of such balance sheet.

[fol. 4567] 2. The corporation may apply to the purchase of stock pursuant to an offer made as provided in subdivi-

sion one hereof, such of its assets as are lawfully available for the purchase of shares of its stock, and an amount of its capital not exceeding the capital represented by the shares so purchased; provided, that the effect of any such purchase and application of capital thereto shall not be to reduce the actual value of the assets of the corporation to an amount less than the total amount of its debts and liabilities, plus the amount of its capital reduced by the amount of capital so applied. The use of capital to such extent for such purpose shall not be deemed to be the declaration or payment of a dividend or a distribution of assets within the meaning of section fifty-eight of the stock corporation law, or constitute a violation of section six hundred sixty-four of the penal law. The shares of stock so purchased may be held or disposed of by the corporation; provided, that the corporation, by resolution of its board of directors, may retire any shares so purchased, and shall retire any thereof purchased through the application of capital, by filing a certificate entitled "Certificate of reduction of capital of (name of corporation) pursuant to section twenty-one of the stock corporation law". Such certificate shall contain the statements prescribed in section thirty-six for certificates under subdivision two and subdivision four of section thirty-five to effect a reduction of capital and the elimination of previously authorized shares, and the reduction of capital stock in conformity therewith. Such certificate shall be subscribed and acknowledged by the president or a vice-president and the secretary or an assistant secretary who shall make and annex an affidavit that they have been authorized to execute and file such certificate by resolution of the board of directors, adopted at a directors' meeting duly called and held on a date specified in such affidavit. There shall be annexed to such certificate an affidavit of the president or a vice-president and also an affidavit of the treasurer or a majority of the directors, stating that the actual value of the assets of the corporation is not less than the total amount of the debts and liabilities of the corporation plus the proposed amount of its capital. Such certificate shall be filed as provided in section thirty-eight in respect of certificates under section thirty-six. Upon the filing of such certificate the shares so purchased shall be eliminated from the authorized capital stock or number of

shares of the corporation, and the capital of the corporation shall be reduced by an amount equal to the amount of capital represented by the shares so retired. The capital of the corporation represented by any shares of stock purchased or otherwise acquired by it pursuant to any provision of this section shall be determined as provided in subdivision two of section twenty-nine.

3. If the corporation shall fail to make an offer within the time specified in subdivision one hereof, or if the objecting stockholder shall fail to accept an offer from the corporation within twenty days after the mailing or delivery thereof, either such stockholder or the corporation may petition the supreme court, at any special term thereof held in the judicial district in which the principal office of the corporation is situated, to determine the value of such stock. Such petition shall be made on five days' notice and shall be made returnable in such court on the fiftieth day after the last day on which the demand of the objecting stockholder for payment might have been made, or, if the rules or practice of such court do not permit such petition to be made returnable on such fiftieth day, then it shall be made returnable on the first succeeding day permitted by such rules or practice. If more than one such proceeding shall have been instituted, the court, in its discretion, may, or on motion of the corporation shall, enter an order directing the consolidation of all proceedings and making such directions with respect to the conduct of the consolidated proceeding as it shall deem proper. Two or more objecting stockholders may join or be joined in any such proceeding.

4. The court shall determine which of the objecting stockholders have complied with the provisions of section fourteen, section twenty, subdivision eleven of section thirty-eight, subdivision seven of section eighty-five, section eighty-seven or subdivision seven of section ninety-one, whichever shall be applicable, and thereby become entitled to have the value of their stock determined. If the court shall find that any of the objecting stockholders are so entitled, it shall proceed to determine the value of their stock, or shall appoint an appraiser to determine such value, and may make such directions in regard to the proceeding as it shall deem proper. If the court shall determine such value without appointing an appraiser, judgment shall be entered against



the corporation and in favor of each objecting stockholder party to the proceeding for the value of his stock so determined. If an appraiser shall be appointed, he shall be duly sworn honestly and faithfully to discharge his duties and thereupon shall proceed to determine the value of such stock, considering all relevant legal evidence which may be produced, and shall cause a stenographic transcript of the testimony to be taken. For all the purposes of this section, such value shall be determined as of the close of business on the day before the taking of the stockholders' vote on the action [fol. 4568] to which objection was made, excluding any appreciation or depreciation directly or indirectly consequent upon such action or the proposal thereof. The appraiser may require any person to attend before him as a witness, and shall have the same powers with respect to all proceedings before him as are conferred upon a person authorized by law to hear, try or determine a matter in relation to which proof may be taken. The appraiser's report shall state his conclusion as to the value of the stock and his reasons therefor, and he shall file such report, together with the transcript of testimony and all exhibits which shall have been offered, with the court within sixty days after his appointment, or within such later period as the court may direct, and shall serve one copy of the report by mail on each party to the proceeding. The court shall consider the report in the light of all the relevant legal evidence and, on motion of any party to the proceeding, shall enter an order confirming, modifying or rejecting the same and, if confirming or modifying, directing the time within which payment shall be made. If the appraiser's determination of value be confirmed or modified by such order, judgment shall be entered thereon against the corporation and in favor of each objecting stockholder party to the proceeding for the value of his stock so determined. If the appraiser's determination of value be rejected, the court in its discretion (a) may determine the value of the stock of the objecting stockholders in the light of all the relevant legal evidence, in which event judgment shall be entered on such determination as in the case of judgment entered upon an order confirming an appraiser's determination of value, or (b) may remit the proceeding to the appraiser, making such directions with respect to further proceedings as may

be deemed proper. Any judgment for the value of stock entered under this subdivision shall include interest from the date of the stockholders' vote on the action to which objection was made; provided, that if, taking into consideration the price which the corporation may have offered to pay for such stock, the financial statements furnished to the stockholder, and such other circumstances as the court may deem relevant, the court shall find that the action of the stockholder in failing to accept such offer was arbitrary and vexatious or not in good faith, no interest shall be allowed. The payment of any such judgment shall not be deemed to be the declaration or payment of a dividend or a distribution of assets within the meaning of section fifty-eight of the stock corporation law, nor constitute a violation of section six hundred sixty-four of the penal law.

5. The costs and expenses of the proceeding shall be determined by the court and shall be assessed against the corporation; provided, that all or any part of such costs and expenses may be apportioned and assessed as the court may deem equitable against any or all of the objecting stockholder parties to the proceeding to whom the corporation shall have made an offer to pay for the stock if, taking into consideration the value of the stock as determined in the proceeding, the financial statements furnished to such stockholders, and such other circumstances as the court may deem relevant, the court shall find that the action of such stockholders in failing to accept such offer was arbitrary and vexatious or not in good faith. Such expenses shall include reasonable compensation to and the reasonable expenses of the appraiser but shall exclude the fees and expenses of counsel and of experts retained by any party; provided, that if the value of the stock as determined in the proceeding shall materially exceed whatever amount the corporation may have offered to pay therefor, or if no offer shall have been made, the court, in its discretion, may award to any stockholder party to the proceeding such sum as the court may determine to be reasonable compensation to any expert or experts retained by such stockholder in the proceeding if the court shall find the retaining of such expert or experts to have been reasonably necessary.

6. Any stockholder demanding payment for his stock shall have no right to receive any dividends or distributions

payable to holders of such stock of record after the close of business on the day next preceding the date of the stockholders' vote in favor of the action to which such objection was made, and upon such vote shall cease to have any other rights of a stockholder of the corporation with respect to such stock, except the right to receive payment for the value thereof as in this section provided; and no such demand may be withdrawn unless the corporation shall consent thereto. If, however, such demand shall have been withdrawn upon such consent, or if no petition for the appointment of an appraiser to determine the value of the stock of such stockholder shall have been made within the time herein provided, or if a court of competent jurisdiction shall determine that such stockholder is not entitled to the relief by this section provided, or if the action to the taking of which objection was made shall be abandoned or rescinded, the status of such stockholder as a stockholder in the corporation thereupon shall be restored; without prejudice, however, to any corporate proceedings which may have been taken during the interim; provided, that such stockholder shall thereupon be entitled to receive any dividends, distributions or other rights to which he would have been or would have become entitled had he not demanded payment for his stock.

[fol. 4569] 7. The corporation shall not be required to make payment for the stock of any objecting stockholder as in this section provided unless, simultaneously, the certificate or certificates representing such stock shall be surrendered to it, duly indorsed in blank and in proper form for transfer, accompanied by evidence of payment of all requisite stock transfer taxes; and any judgment rendered pursuant to this section shall so provide. Upon receipt of such payment, the objecting stockholder shall cease to have any interest in the corporation or its assets by reason of his ownership of the stock so paid for, and such stock may be held or disposed of by the corporation; provided, that if payment for the stock of an objecting stockholder shall have been demanded in consequence of action taken on a merger or consolidation pursuant to sections eighty-five, eighty-six or ninety-one, the shares or other securities of the resulting or surviving corporation into which the shares of the objecting stockholder would have been converted had

no objection been made shall, unless the certificate of merger or consolidation shall otherwise provide, be deemed to have been duly issued in accordance with the terms of such certificate and reacquired by the resulting or surviving corporation, and may be held or disposed of by it free of any preemptive rights of stockholders. The corporation, by resolution of its board of directors, may retire any shares of stock acquired by it upon the payment of a judgment for the value thereof, by filing a certificate as provided in subdivision two hereof for the retirement of shares purchased pursuant to an offer; except, that the affidavits of the president or a vice-president and of the treasurer or a majority of the board of directors, specified in the said subdivision two, relative to the actual value of the assets of the corporation, shall not be required. Upon the filing of such certificate the shares so acquired shall be eliminated from the authorized capital stock or number of shares of the corporation, and the capital of the corporation shall be reduced by an amount equal to the amount of capital represented by the shares so retired.

8. Within twenty days after the last day on which a demand for payment might have been made, each stockholder demanding payment, unless the offer of the corporation to pay therefor shall have been accepted, shall submit his stock certificate or certificates to the corporation for notation thereon of the fact of such demand; and any stockholder who shall fail so to do shall not be entitled to the relief by this section provided unless a court of competent jurisdiction, for good and sufficient cause shown, shall otherwise direct. Upon any subsequent transfers of such stock on the books of the corporation prior to payment by the corporation of the value thereof, as herein provided, the new certificate or certificates issued therefor shall bear a similar notation, together with the name of the original objecting holder of such stock, and, until such payment shall have been made, no transferee of any such stock shall acquire any rights of any character whatsoever by reason thereof except the rights of the original objecting stockholder.

9. In any case where the action with respect to which objection was made shall have been taken with, or authorized by, the consent of stockholders without a meeting, the



actual date upon which the written consent to such action is first obtained from the requisite number of stockholders, or, in case such action shall have been taken pursuant to section eighty-five of the stock corporation law, the date of filing the certificate of ownership as in such section provided, shall for all purposes be deemed to be the date of the stockholders' vote referred to in subdivisions four and six of this section.

[fol. 4570] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 10

New York Stock Exchange

Listing Fee Agreement—Form A.

Agreement made this 13th day of March 1959 by Aluminum Company of America, a corporation duly organized and existing under the laws of the Commonwealth of Pennsylvania (hereinafter called the Company), with the New York Stock Exchange (hereinafter called the Exchange),

Witnesseth:

Whereas, the Company has filed its application for listing upon the Exchange of 355,226 shares of Common Stock; and

Whereas, it is a requirement of the Exchange that, as a condition precedent to the consideration of such application an initial listing fee must accompany the application and, in addition, there must be filed with the Exchange an agreement to pay an annual fee for the continuance of such shares upon the list of the Exchange;

Now, Therefore, in consideration of the Exchange receiving and considering the Company's application for the listing of the above mentioned shares of stock, the Company hereby covenants and agrees as follows:

1. Provided any of the above mentioned 355,226 shares are outstanding and listed on the Exchange when any annual payment is due as hereinafter set forth, the Company will pay to the Exchange each year for a period of fifteen years a continuing fee, with respect to such shares, or any

part thereof, to be calculated as to each payment as provided in the Schedule of Listing Fees hereto annexed and made a part hereof. The first payment is to be made within thirty days after the first anniversary of the date of the original admission of any shares of the issue to dealings on the Exchange (whether or not shares covered by the above mentioned application) and the annual payments thereafter are to be made each within thirty days after the succeeding anniversaries of such admission.

2. Any payments heretofore or hereafter made by the Company to the Exchange in connection with the above mentioned application are hereby declared to be subject [fol. 4571] to the provisions of Schedule hereto annexed and made a part hereof, as the same may be amplified or modified by the foregoing terms of this agreement.

In Witness Whereof, the Company has caused these presents to be executed by its proper officers thereunto duly authorized and its corporate seal to be hereunto affixed, as of the day and year first above written:

Aluminum Company of America, by /s/ Leon E. Hickman, Vice President & General Counsel.

[Seal.]

Attest:

/s/ Alfred M. Hunt, Secretary.

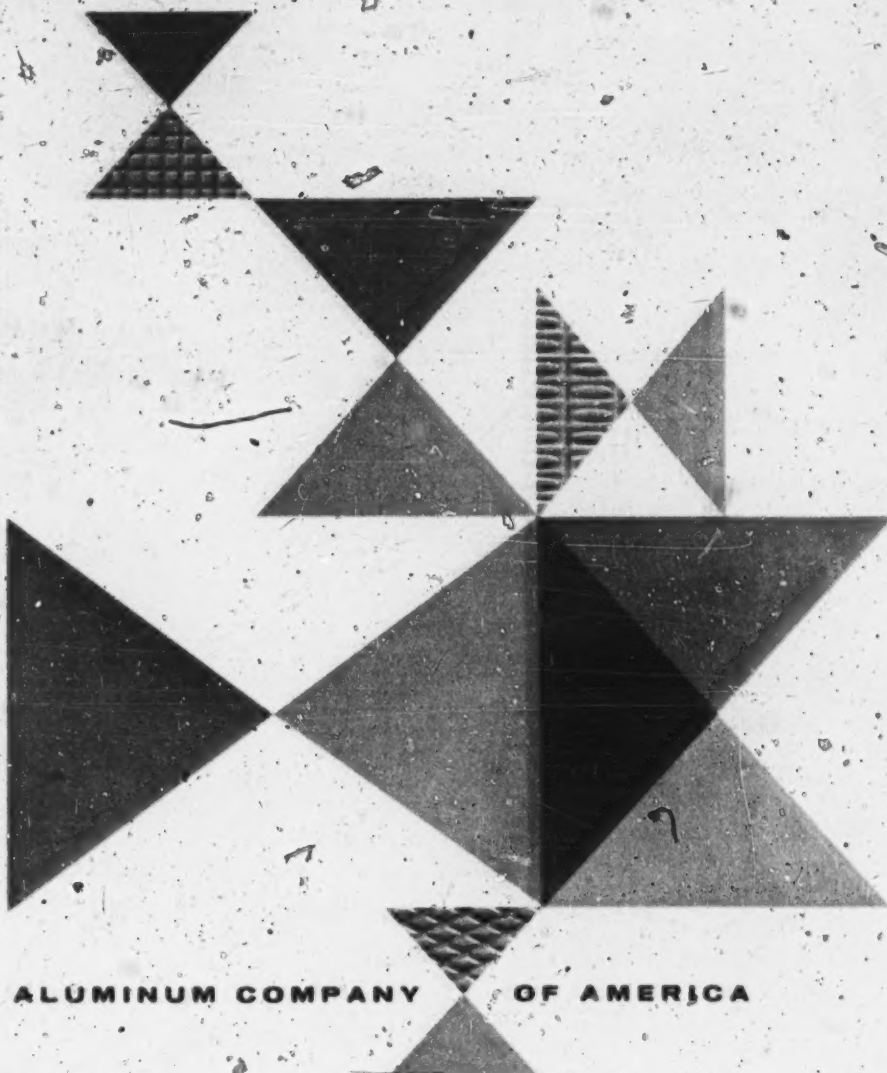
[Vol. 4572] IN UNITED STATES DISTRICT COURT

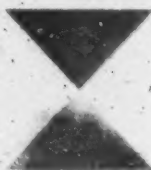
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PLAINTIFF'S EXHIBIT 46

# ALCOA ANNUAL REPORT

1958





# ALUMINUM COMPANY OF AMERICA

*Wholly Owned Subsidiaries*

## ALCOA EXPLORATION COMPANY

Conducts bauxite mining operations in the Dominican Republic.

## ALCOA GENERATING CORPORATION

Owms and will operate the power plant now under construction which, when completed, will furnish power to the Warrick works near Evansville, Indiana.

## ALCOA INTERNATIONAL, INC.

Sells aluminum products in foreign markets, holds stock of a partially owned related company, and owns ships used for transporting bauxite from Suriname to Trinidad and United States ports.

## ALCOA MINERALS INC.

In the process of exploring for bauxite in areas held under concession from the Republic of Panama.

## ALCOA OF COSTA RICA, INC.

In the process of exploring for bauxite in Costa Rica.

## ALCOA PROPERTIES, INC.

Owms coal properties in Indiana and Kentucky, to supply fuel for power generation at the Warrick works, near Evansville, Indiana, and at a possible future smelter near Sturgis, Kentucky.

## ALCOA SECURITIES CORPORATION

Holds stock of certain partially owned affiliated companies, and other securities.

## ALCOA SERVICE CORPORATION

Renders building services, and owns certain sales office buildings and other real estate holdings.

## ALCOA STEAMSHIP COMPANY, INC.

Owms, charters and operates ships transporting bauxite from Suriname, Trinidad and the Dominican Republic to the United States, and offers commercial service between United States East and Gulf Coast ports and the Caribbean.

## ALTON AND SOUTHERN RAILROAD

Owms and operates a belt line and terminal railroad in the vicinity of the East St. Louis, Illinois, works.

## ALUMINIO ALCOA (VENEZUELA) S. A.

Holds capital stock of partially owned affiliated companies in Venezuela.

## BAUXITE & NORTHERN RAILWAY COMPANY

Owms and operates a railroad in the vicinity of the Bauxite, Arkansas, works.

## CEDAR CREEK COMPANY

Operates a railroad switching service at the Bridgeport, Connecticut, works.

## CEDARS RAPIDS TRANSMISSION COMPANY, LIMITED

Owms and operates electric transmission lines in Canada, transmitting electric energy for use at the Massena, New York, works.

## COLUMBIA RIVER ORCHARDS COMPANY

Operates fruit orchards owned by Aluminum Company of America in the vicinity of the Wenatchee, Washington, works.

## LAVACA PIPE LINE COMPANY

Owms and operates gas pipelines to transport natural gas to the Point Comfort, Texas, works.

## THE MASSENA TERMINAL RAILROAD COMPANY

Owms and operates a railroad in the vicinity of the Massena, New York, works.

## NANTAHALA POWER AND LIGHT COMPANY

Owms and operates hydroelectric power plants and an electric utility system in western North Carolina.

## PLEASANT HILLS WATER COMPANY

Supplies water for public and private use in the town of Riverdale, Iowa, near the Davenport, Iowa, works.

## POINT COMFORT & NORTHERN RAILWAY COMPANY

Owms and operates a railroad in the vicinity of the Point Comfort, Texas, works.

## POINT COMFORT WATER COMPANY

Owms the supply of fresh water for the refining plant at the Point Comfort, Texas, works.

## ROCKDALE, SANDOW & SOUTHERN RAILROAD COMPANY

Owms and operates a railroad in the vicinity of the Rockdale, Texas, works.

## THE ST. LAWRENCE RIVER POWER COMPANY

Owms and operates electric transmission lines and a water distribution system at the Massena, New York, works.

## SURINAME ALUMINUM COMPANY

Conducts bauxite mining operations on lands held under concession from the Suriname government; and is in the process of carrying out the power and smelting undertakings designated in the Brokopondo Agreement.

## SURINAME TRANSPORT COMPANY, N. V.

Owms floating equipment used for mine dredging and ship towing in Suriname.

## TAPOCO, INC.

Owms and operates (a) the Tallassee Project, a federally licensed hydroelectric development consisting of four power plants in North Carolina and Tennessee, to furnish power to the Alcoa, Tennessee, works, and (b) water distribution systems to supply water for that works and surrounding communities.

## WEAR-EVER ALUMINUM, INC.

Sells Wear-Ever aluminum cooking utensils, Kensington giftware, Cutco cutlery, Westmorland sterling and Alcoa Wrap.

## WEAR-EVER INTERNATIONAL, INC.

Sells Wear-Ever aluminum cooking utensils and Cutco cutlery in Latin America.

## YADKIN, INC.

Owms and operates the Yadkin Project, a federally licensed hydroelectric development consisting of four power plants (three in operation and one to be constructed) in North Carolina, to furnish power to the Badin, North Carolina, works.



## 1958

## ANNUAL REPORT

*Directors and Officers as of December 31, 1958*

**Board of Directors**

M. M. ANDERSON  
RALPH V. DAVIES  
LEON E. HICKMAN  
ALFRED M. HUNT  
ROY A. HUNT  
FRANK L. MAGEE  
RICHARD K. MELLON  
GEORGE J. STANLEY  
I. W. WILSON  
GEORGE W. WYCKOFF

**Honorary Chairman**

ARTHUR V. DAVIS

**Officers**

I. W. WILSON.....Chairman of the Board  
ROY A. HUNT.....Chairman of the Executive Committee  
FRANK L. MAGEE.....President  
N. R. ALTHAUSER.....Vice President and Controller  
M. M. ANDERSON.....Vice President in Charge of Personnel and Industrial Relations  
FREDERICK J. CLOS.....Vice President in Charge of Sales Development and Commercial Research Divisions  
RALPH V. DAVIES.....Vice President in Charge of Sales  
H. C. ERSKINE.....Vice President in Charge of Smelting and Lubricating Operations  
\*LEWIS P. FAVORITE.....Vice President in Charge of Product Sales and Distribution  
B. J. FLETCHER.....Vice President, General Manager of Engineering  
J. P. HAIGHT.....Vice President in Charge of Engineering and Purchasing  
ARTHUR P. HALY.....Vice President in Charge of Public Relations and Advertising  
LEON E. HICKMAN.....Vice President and General Counsel  
R. O. KEEFE.....Vice President, General Purchasing Agent  
LAWRENCE LITCHFIELD, JR.....Vice President in Charge of Raw Materials and Refining Divisions  
ROBERT B. MCKEE.....Vice President in Charge of Sales Offices and Direct Selling  
EDWARD B. WILBER.....Vice President and Treasurer  
\*D. WILMOT.....Vice President in Charge of Product Sales and Distribution  
ALFRED M. HUNT.....Secretary

\*Effective February 1, 1959, Mr. Favorite was elected vice president, succeeding Mr. Wilmot, who retired.

**Assistant Officers**

C. C. CONNER.....Assistant Secretary  
R. E. COULTER.....Assistant Treasurer  
HARRY FLYNN.....Assistant General Counsel  
S. T. GUSTINA.....Assistant Controller  
C. W. HEAD.....Assistant Treasurer  
MATT. W. STANLEY.....Assistant Treasurer  
W. K. UNVERZAGT.....Assistant General Counsel

**ANNUAL MEETING**

The annual meeting of shareholders of Aluminum Company of America will be held on Thursday, April 16, 1959, at 10:00 a.m., E.S.T., in the Pittsburgh Room, Penn-Sheraton Hotel, Pittsburgh, Pa.

## FINANCIAL HIGHLIGHTS

	1955	1954
Gross Revenues .....	\$758,143,787	\$875,461,218
Net Income .....	42,885,230	75,568,461
Per Share of Common Stock .....	1.96	3.55
Taxes .....	44,212,978	83,026,664
Per Share of Common Stock .....	2.14	4.03
Dividends Declared		
Preferred Stock .....	2,474,689	2,474,689
Per Share .....	3.75	3.75
Common Stock .....	24,767,339	24,728,326
Per Share .....	1.20	1.20
Total Dividends .....	27,242,028	27,203,015
Earnings Reinvested in the Business .....	15,643,202	48,365,446
Capital Expenditures .....	81,599,867	207,500,256
Net Working Capital .....	293,035,238	187,788,303
Ratio of Current Assets to Current Liabilities .....	4.18 to 1	1.98 to 1
Common Stock Equity .....	621,149,965	604,540,293
Equity Per Share of Common Stock .....	30.09	29.34

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## To the Shareholders of ALCOA

Alcoa's sales and earnings dropped substantially in 1958, reflecting generally reduced activity in the national economy. Although an upward trend in aluminum consumption was noticeable over the course of the year, the company's smelters and fabricating facilities operated well below capacity.

To the aluminum industry throughout the world, surplus productive capacity has been a significant problem. Intense competition, particularly in the area of prices, prevailed throughout the year. Late in March, when the price of aluminum dropped on the world market, your company met this situation by reducing the price of primary aluminum pig from 26 cents to 24 cents per pound, effective April 1. By August 1, conditions were such that part of this reduction could be restored, and Alcoa led U. S. producers with an increase of seven tenths of a cent per pound. This price increment, however, only partially offset wage increases under existing labor agreements and other rising costs.

Although the existence of surplus productive capacity throughout our industry caused many problems during this period, it serves as an essential element of future growth. To stimulate the expansion of aluminum markets, the company placed added emphasis on its research and development program in 1958. At the same time, an aggressive sales and advertising campaign was conducted to promote new uses and to increase the sale of aluminum for its many present applications. The success of these efforts is indicated by an increase in the use of aluminum per unit of output of many durable goods products in a year when production of such products was sharply curtailed.

A number of market developments of 1958 point toward great opportunities for the growth of aluminum usage in the years ahead. One outstanding example is the building and construction industry, where developments in the field of residential construction are especially promising. Significant progress has also been made in automobile, highway, packaging and electrical applications.

Throughout the company's operations, major emphasis has been placed on cost reduction and increased production efficiency. As a result, important savings have been realized in man power and operating expenses. These improvements were made possible only by a united effort on the part of all Alcoa employees.

On March 25, 1959, the shareholders of Rome Cable Corporation will vote on a proposal made by Alcoa to acquire the assets of Rome in exchange for 353,226 shares of common stock of Alcoa and the assumption by Alcoa of the obligations of Rome. The proposal has been approved by the Board of Directors of Rome. If the sale is approved by its shareholders, the assets of Rome will be transferred to Alcoa as of March 31, 1959. Rome Cable Corporation is a successful and respected wire and cable company (largely copper) and its consolidation with Alcoa will make available to Alcoa facilities and personnel needed to expand our aluminum conductor markets as well as greatly extending the line of products offered to the trade through a single organization.

In submitting this report, the directors and officers take this opportunity to gratefully acknowledge the many contributions made by the men and women of Alcoa who have worked together so effectively during this difficult period. Their loyalty and cooperation in carrying on the affairs of this enterprise are a firm basis for Alcoa's future success.

I. W. WILSON, *Chairman of the Board*  
FRANK L. MAGEE, *President*

1501 Alcoa Building  
Pittsburgh 19, Pennsylvania  
March 1, 1959



4577

1462



*Pittsburgh's John J. Kane Hospital, completed in 1958, incorporates nearly two million pounds of Alcoa aluminum in functional and decorative applications.*



## MARKETS

Demand for aluminum fensated at reduced levels during 1958, reflecting the continued effect of the general business recession. In an effort to offset this market condition, the company placed heavy emphasis on an increasingly aggressive sales effort coupled with an intensified research and development program.

**BUILDING AND CONSTRUCTION.** One of the largest markets for aluminum again was the building and construction industry. Aluminum faced buildings of the monumental type increased in number during 1958. Two outstanding examples where Alcoa aluminum was specified were the 47-story Time Rockefeller Building and the 60-story Chase Manhattan Building, both in New York City.

A promising architectural development of the year was the trend toward aluminum in residential construction, which was keennoted by the announcement of a complete line of manufactured aluminum dwellings by National Homes Corporation. The new houses were inspired by Alcoa's widely publicized Care-free Home described in last year's report and were designed through cooperative research and engineering by Alcoa and National Homes Corporation. Aluminum was also prominently featured in the 1958 research homes sponsored by the National Association of Home Builders.

**TRANSPORTATION INDUSTRY.** Another leading market for aluminum was transportation, with automotive applications remaining the largest single segment. Aluminum applications in 1958 model passenger automobiles increased more than 10 per cent over 1957 models and reached an average of 275.2 pounds per car for the year.

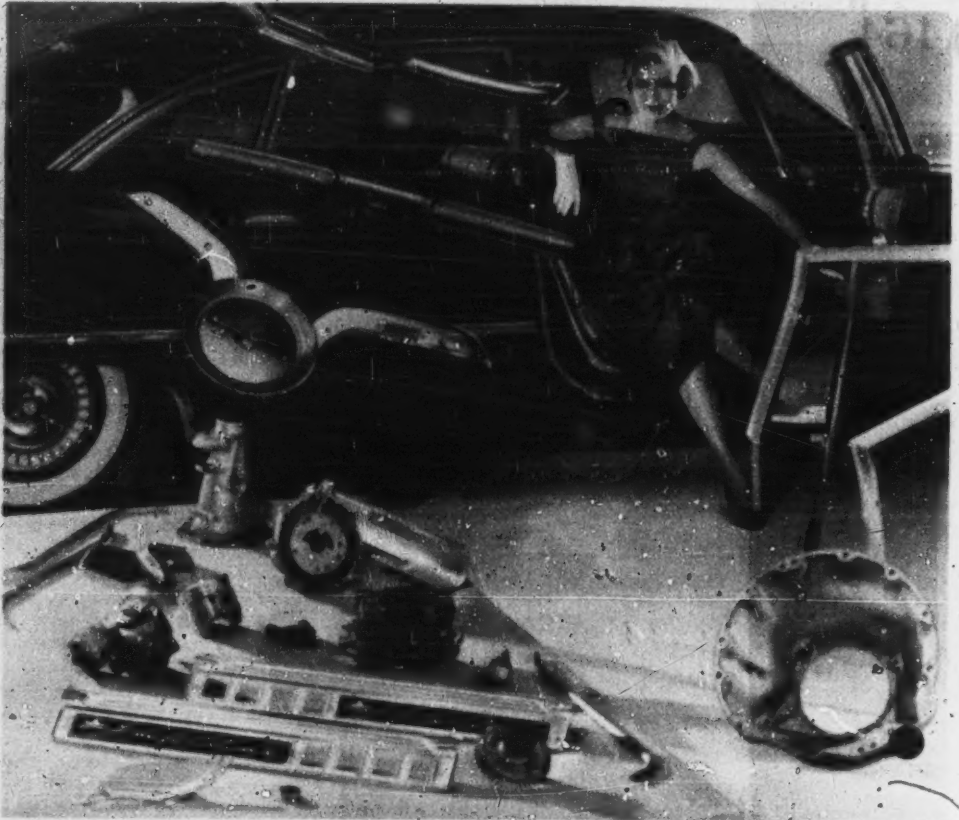
It now appears that the automotive industry is on the threshold of a development that should have an important effect on the use of aluminum. An all-aluminum engine is reported to be imminent, and is expected to appear first on some 1960 models.

While aircraft production continues to consume large quantities of aluminum, missiles have also become a promising new field of application. Typical aluminum missile parts now in use or under consideration are skins, fuel boxes, structural and mechanical parts, launching devices and ground handling equipment.

**STRUCTURAL APPLICATIONS.** Important progress was made in structural applications for aluminum during 1958. In September, the first welded aluminum girder type highway bridge was dedicated at Den Moines, Iowa, a result of a project jointly sponsored by the State of Iowa, Aluminum Company of America

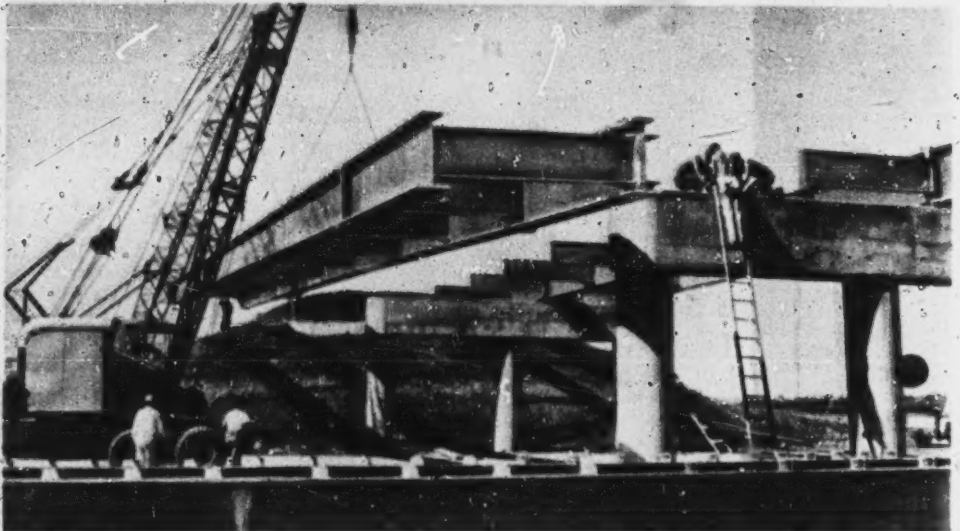


The Chateau model of National Homes Corporation's new Viking line employs 3,000 pounds of aluminum. The Viking line was inspired by Alcoa's Care-free Home.



Nearly 100 pounds of aluminum are used in this 1935 Chrysler. Average for all 1935 passenger automobiles was 47.32 pounds per car.

This aluminum highway bridge, constructed in 1932 State of Iowa during 1933, represents a vast new market for aluminum.



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and two other major aluminum producers. Another aluminum bridge which Alcoa helped to sponsor was designed and built by Fairchild Engine and Airplane Corporation, and was tested by Lehigh University's Department of Civil Engineering. The Fairchild bridge incorporates proven aircraft principles, can be mass-produced in sections and is quickly and easily transported and assembled. Since the nation's highway construction program will include some 60 to 70 thousand bridges, these developments may help to create a large new market for aluminum.

Another significant development took place in the electric utility field, when Public Service Electric and Gas Company, Newark, N. J., announced that it intended to use 60 aluminum towers on an 11-mile power transmission line. This structural application of aluminum in the electrical industry is the latest in a series introduced under the leadership of Alcoa. It further extends the use of the metal in a field that has long been an important market. Aluminum is a leading material for use in overhead transmission, primary and secondary distribution, busway systems, and light and heavy industrial bus runs. It is also used in electrical substations, utility pole crossarms and the upper "hot" part of transmission towers.

**ELECTRICAL EQUIPMENT.** Progress in the electrical equipment industry was less spectacular, but equally promising. New developments in coil winding now make it possible for electrical manufacturers to realize substantial savings by using aluminum sheet and foil as strip windings in a wide range of applications from large transformers to miniature radio cells. Cast aluminum rotors and stators were employed in most of the 50 million fractional horsepower motors produced in this country during 1958.

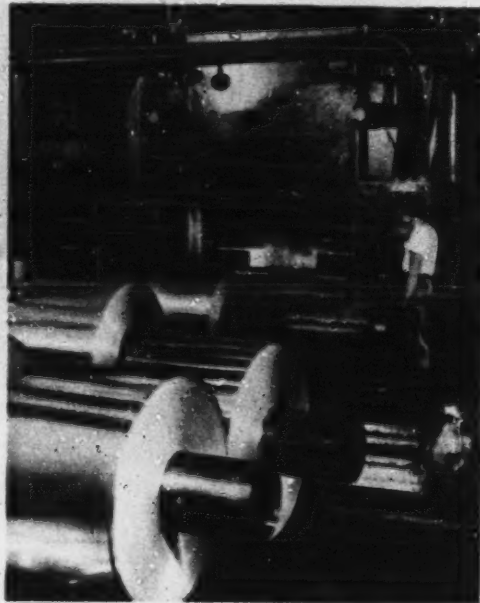
**HIGHWAY APPLICATIONS.** During 1958, the use of aluminum in bridge railings, signs, fences, gates and lighting equipment continued to be an important field of application. This use of aluminum is also expected to grow as the nation's highway construction program continues.

**CONTAINERS AND PACKAGING.** As in past years, aluminum had a significant part in the expanding market for containers and packaging. Foil containers are becoming increasingly popular, and the use of aluminum for this application continued to grow.

*Aluminum's role in the jet age is illustrated by the fact that nearly 50 tons of the light metal are used in the new Boeing 707 Stratoliner.*



*A modern foil mill at Davenport, Iowa, works—part of Alcoa's new facilities built to meet the increasing demand for foil in home and industry.*



[fol. 4581]

**RESEARCH AND DEVELOPMENT**

Throughout 1958, Alcoa continued to maintain its industry-wide leadership in research and development. To strengthen this position still further, the company reorganized and extended its network of technical committees and, at the same time, placed them under more unified direction. These steps are expected to improve the effectiveness of the company's research and development program, and to provide even greater opportunity for outstanding accomplishment.

**PROGRESS ON NEW RESEARCH CENTER.** Alcoa is continuing with its plans, first reported in 1957, to provide for present and future expansion of its research and development facilities. The location to be developed is a 2,300-acre site at Merwin, Pa., a short distance from the present headquarters of Alcoa Research Laboratories at New Kensington, Pa. Survey

work has begun, and preliminary building plans are being developed.

**FACILITIES ADDED.** In order to take advantage of the market possibilities offered by electrical equipment, the company purchased facilities of the Transformer Division of Automation Instruments, Denver, Colo., and installed them at Alcoa Research Laboratories. These facilities will be used to develop insulating coatings and winding techniques for the production of coils from aluminum strip and foil.

**NEW DEVELOPMENTS.** Several new products and processes introduced in 1958 offer considerable promise. One development of special significance is a new high-strength, high-modulus alloy for aircraft, containing lithium as a principal alloying constituent. Known as Alloy X-2020, this new product will main-

*This huge ingot, weighing 21,000 pounds, was cast at Lafayette, Ind., works for fabrication into missile components by an Alcoa customer.*





fol. 45827

tain high strength up to 400° F. thus extending by more than 100° F the usefulness of aluminum in the construction of supersonic aircraft.

Another noteworthy development of the year was a new line of aluminum architectural products for roofing, siding, fence panels and garage doors. Finished in a variety of baked alkyd enamel colors, the new product is sold under the trade name, Alumalure, and is available in either flat or coiled sheet.

After several years of development work, Alcoa is now offering a complete line of aluminum rain-carrying equipment (gutters, downspouts and related equipment) for residential use. These architectural accessories have been designed for ease of installation, serviceability and unusual aesthetic appeal.

A complete new line of aluminum rain-carrying equipment for residential use was announced by Alcoa in 1953.



Alcoa's development of high-strength alloys and materials for high temperature ceramics has greatly broadened the market possibilities for the company's products in the field of missiles and rockets.



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[fol. 4583]

## ADVERTISING AND SALES PROMOTION HIGHLIGHTS

Alcoa again conducted an aggressive, imaginative advertising and sales promotion campaign throughout the year. The company's FORECAST program of stimulating new uses for aluminum was continued with the announcement of five new design creations.

In response to the urgent need for 500,000 new classrooms in America's school system, Alcoa financed the preparation of an unusual book entitled *SCHOOLHOUSE: What to Do When Your Neighborhood Needs a School*. Now available in bookstores throughout the country, the publication was sponsored by Alcoa as a public service. Public response to the new book has been enthusiastic.

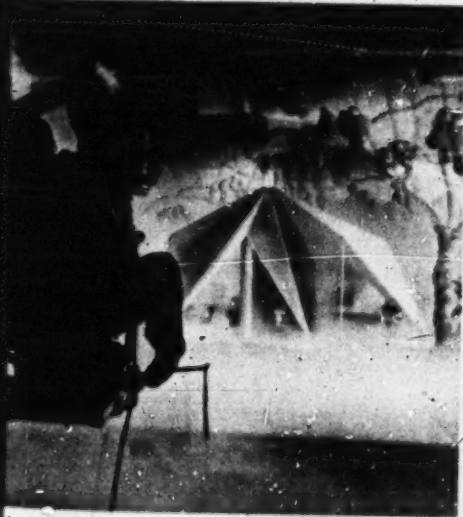
Alcoa's residential housing program for 1958 involved the largest amount of national and local publicity ever devoted to this activity. Part of this program was a follow-up of the 1957 Care-free Home cam-

paign and was concentrated on new residential developments announced during 1958 (see page 5).

During 1958, the company continued its unusual program of promoting Alcoa Wrap household foil by including samples in metropolitan newspapers. In this manner, some 3,000 miles of foil were distributed to nearly 9 million families during 1958. Sales of Alcoa Wrap increased significantly in every area where the program was used.

Supporting all of Alcoa's promotional programs, the *Alcoa Theatre* continued to give top entertainment to a nationwide audience through its half hour TV dramatic series. Planned for wide audience appeal, each *Alcoa Theatre* production used three minutes for its commercial messages. Subjects for these messages were selected from the company's customer support, Alcoa Wrap and institutional programs.

Company executives examine plans for Alcoa Market-Maker Promotion, designed to create new uses for aluminum by intensive advertising in seven major markets.



Camera crew films scene from Alcoa's latest movie entitled "A Product of the Imagination." Film tells story of aluminum's development and many uses.

[vol. 4584]

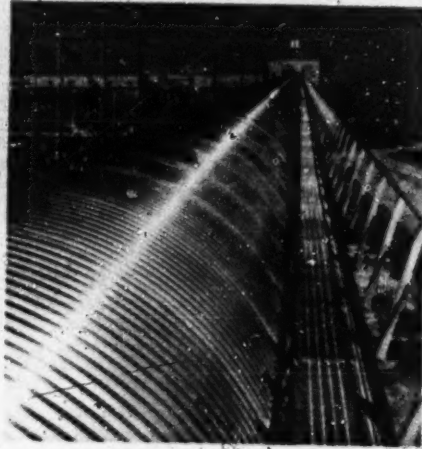
## FACILITIES

While the company's sales and research divisions were carrying out a vigorous campaign to promote the sale and broaden the use of aluminum, Alcoa's manufacturing locations worked effectively to cut production costs, prolong the life of existing equipment and generally increase the production efficiency of all facilities.

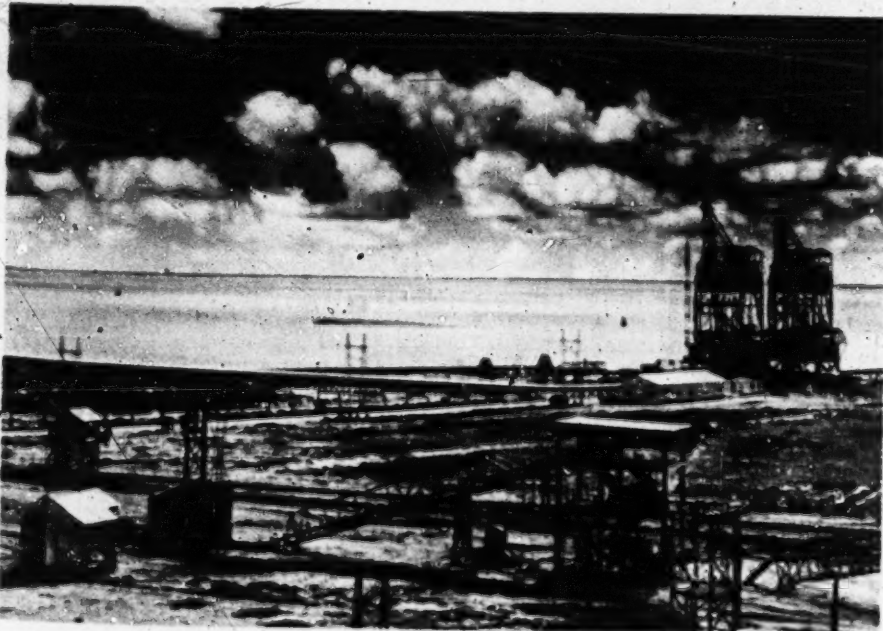
Significant savings in man power and operating expenses were achieved as a result of careful auditing of production activities, planned simplification of paperwork, establishment of data processing equipment and rearrangement of work patterns for increased efficiency. Close control was exercised over the replacement of equipment, and increased emphasis was placed on prolonging the operational life of existing equipment.

Production facilities generally operated at substantially reduced volume throughout 1958. Total production of primary aluminum was 520,000 tons compared with 712,000 tons in 1957.

*New bauxite conveyor system transports ore from dock to storage area at recently completed Point Comfort alumina plant.*



*Dock and related facilities at Alcoa's Point Comfort, Tex., alumina plant, which were completed during 1958.*





*View of new alumina plant which is being constructed at Point Comfort, Tex.*

#### **Raw materials—refining**

Significant progress was made during 1958 in increasing the company's available supply of raw materials. The acquisition of new or extended bauxite concessions in a number of foreign locations is described under "Foreign Activities."

In addition, Alcoa has continued to provide for new sources of electric energy by continued exploration for natural gas and oil deposits, and by acquiring extensive new reserves of coal. In southern Indiana, Alcoa completed purchase of coal reserves and land properties for use at Warrick works power plant, and provided facilities for mining, processing and trans-

porting the coal, through contractual arrangements with Peabody Coal Company.

To provide facilities capable of refining Caribbean bauxite and to increase the supply of alumina for Alcoa smelters in the Gulf Coast area, the company continued construction of a new alumina plant at Point Comfort, Tex. Shipping of ore to this plant will be facilitated by a 36-foot deep channel from the Gulf of Mexico to Matagorda Bay. The channel was authorized by Congress in 1958, and is to be constructed by the U. S. Corps of Engineers, subject to appropriation of the necessary funds.

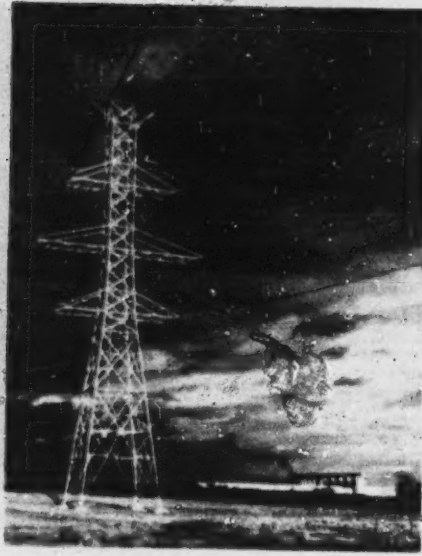


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**Smelting**

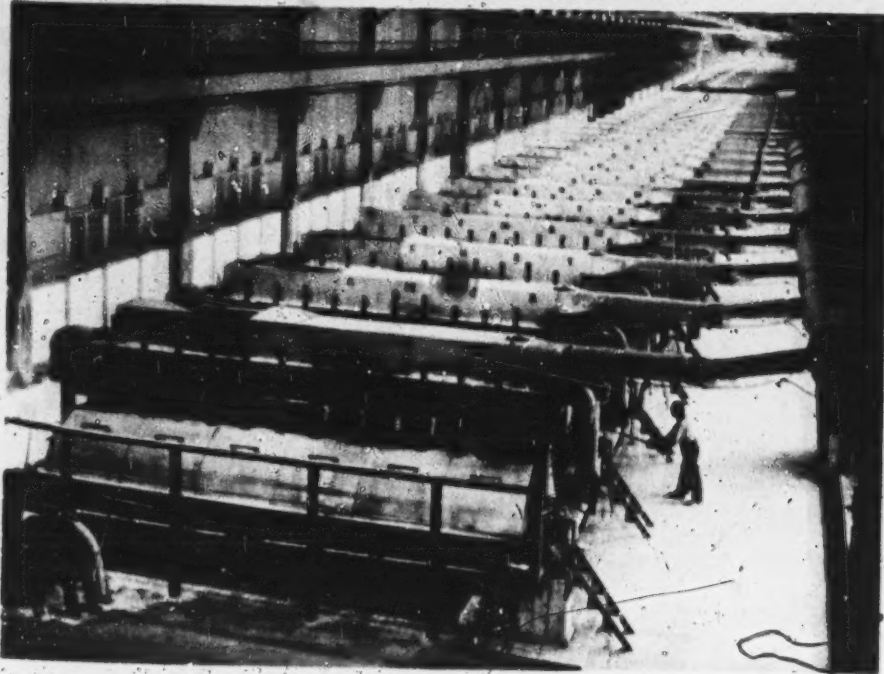
Alcoa's smelting activities during 1958 were conducted with constant emphasis on modernization of equipment and improvement in production practices at all operating locations. Because of the company's confidence that the demand for aluminum would continue to grow in years to come, none of the smelting Division's expansion plans were canceled. Instead, construction programs were slowed down and completion dates were extended.

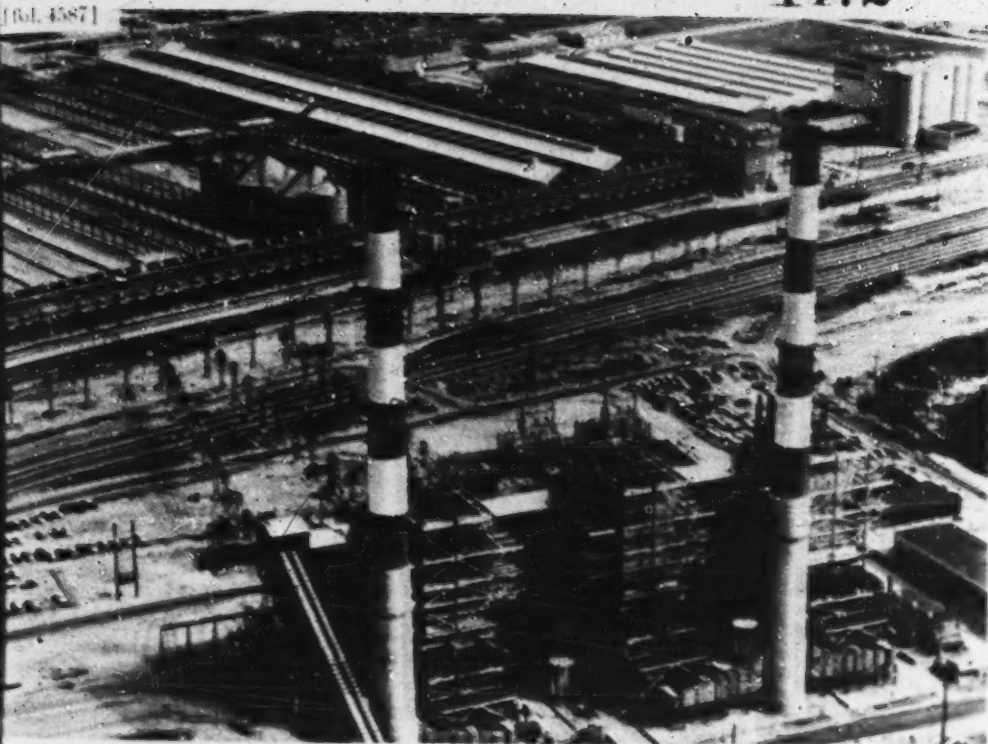
A concerted effort to ensure a long-range power supply at all Alcoa smelters was continued, and considerable progress was made. The company was



A vast network of power lines transmits electricity from the St. Lawrence Project to Alcoa's Massena, N. Y., works.

This new potline is one of two placed in operation during 1958 at Massena, N. Y., works.





*Construction was essentially completed on the power plant and one potline at Warlick works near Knoxville, Ind.*

granted a 50-year license by the Federal Power Commission on a new dam at Tuckertown, N. C., and three existing dams on the Yadkin River—all to be known as the Yadkin Project. This hydroelectric development will serve as the power source for operations at the Rardin, N. C., works.

At Massena, N. Y., two of three new potlines were completed and placed in operation during the year. With the production of aluminum from these new potlines, Alcoa became the first industrial user of power from the St. Lawrence Project of the Power Authority of the State of New York. These facilities

were built to replace potlines using power from Alcoa's own generating station which will become permanently inoperable with the completion of the St. Lawrence Seaway and Power Project.

A new potline at the Point Comfort, Tex., smelter, was essentially completed. When placed in production, the new line will increase the production capacity of the Point Comfort smelter to 140,000 tons per year.

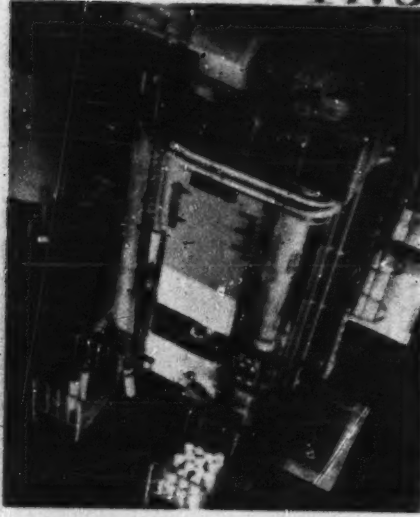
At Warlick works, construction was continued on the new smelter, although at a reduced rate. The Warlick works power station is scheduled for completion early in 1959.

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**Fabricating**

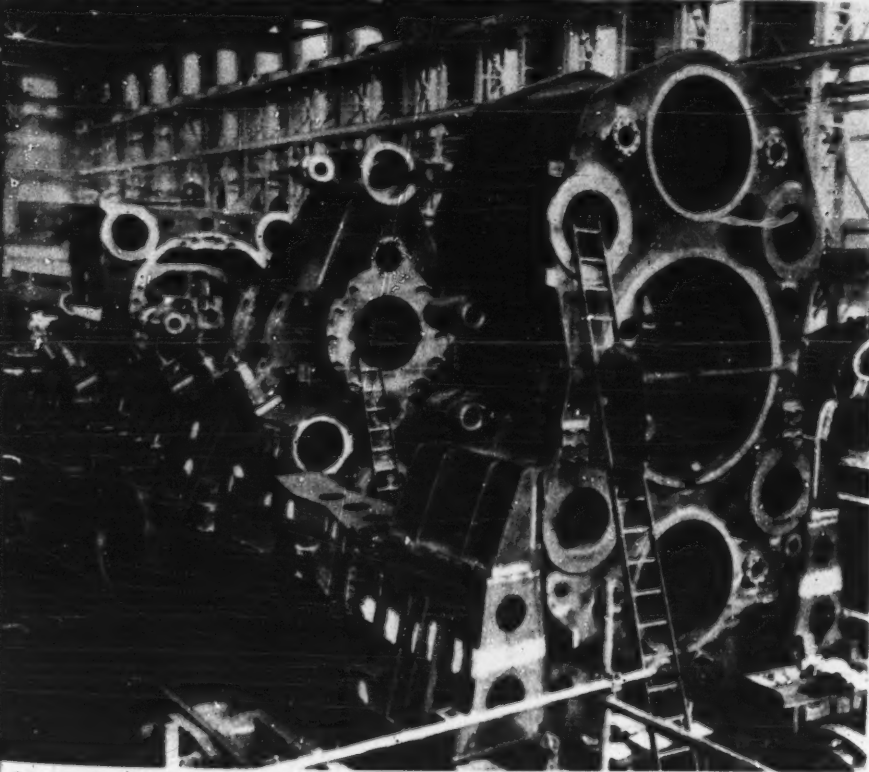
In response to the growing demand for foil packaging materials, the company installed an additional foil laminator at the Davenport, Iowa, works. This equipment laminates foil to paper for use in the packaging and building industries.

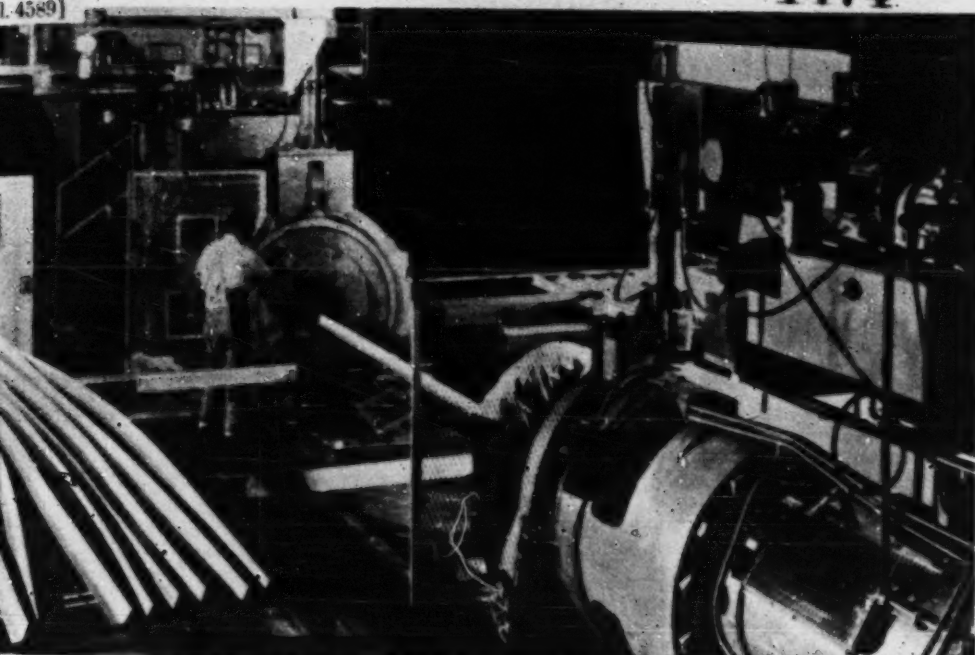
A 2,500-ton vertical impact extrusion press was installed and began production at Cressona, Pa. This new press produces one-piece, seamless semi-hollow or solid shapes having forged bases and one or more extruded walls. Products of this type are used widely



Large impact extrusions for aircraft, automotive and electrical industries are fabricated on this new press at Cressona, Pa., works.

New Alcon-owned 14,000-ton extrusion press for Lafayette, Ind., works is assembled in manufacturer's plant. New press is twin to Air Force press at Lafayette.





*Extrusions produced at Vernon works in Los Angeles, Calif., are straightened on new 750,000-lb stretcher. Stretching relieves stresses which develop during fabrication.*

by the aircraft, appliance and electronics industries.

The first shipment of parts for a 14,000-ton Alcoa-owned extrusion press was received at the Lafayette, Ind., works. This press is to be a companion to the Air Force-owned press already in operation there, and is being built to meet an increasing demand for large, high-strength aluminum alloy extrusions, primarily in the aircraft and missiles fields. Construction of auxiliary equipment continued in 1958, and the press foundation has been completed.

At Richmond, Ind., facilities were installed for making a new screw-on cap for baby food jars developed by Alcoa to meet an urgent market need. This development, which also involved the fabrication of filling and capping equipment for use in customers' plants, is expected to offer wide market possibilities.



## FOREIGN ACTIVITIES

1475

In 1958, Alcoa broadened the scope of its foreign activities and made a number of organizational changes designed to take advantage of the promising opportunities offered by foreign markets.

**NEW ORGANIZATIONAL PROVISIONS.** To promote and supervise the development of these activities, a new international division of Alcoa was established and the operations of Alcoa International, Inc., a subsidiary of Alcoa, were expanded. These organizations are designed to develop foreign markets by the direct sale of Alcoa products, by the licensing of foreign companies to manufacture aluminum products with Alcoa technical advice, or by investment in overseas manufacturing facilities.

**EXPLORATION AND MINING ACTIVITIES.** In a series of steps taken to prepare for the anticipated growth of markets, the company has entered into agreements with foreign governments assuring bauxite mining concessions in a number of foreign locations. Exploration activities are now being carried on.

Through an agreement with the Government of Suriname signed in 1958, Suriname Aluminum Company (Suralco), a wholly owned subsidiary, extended its rights for additional bauxite concessions in that country and initiated a program to build a hydro-electric development and smelting facilities there. This agreement also provides for the eventual construction of a bauxite refining plant in Suriname. Preliminary engineering investigations on the over-all project, known as the Brokopondo Development, are under way. A description of the Brokopondo Agreement was given in the 1957 Annual Report.

During the year, Alcoa contracted for the sale of 600,000 tons of Suriname bauxite and its shipment by Alcoa Steamship Company, Inc., to government stockpiles in the United States.

Other Alcoa explorations and mining prospects are being carried out in Costa Rica, Panama, and the Dominican Republic. In Costa Rica, exploratory drilling operations resulted in the development of substantial new reserves of bauxite, while the results of exploration in Panama have proved promising enough to warrant the negotiation of a government contract establishing Alcoa's mining rights in that country. Construction of mining and dock facilities at Cabo Razo, Dominican Republic, were completed during the year, and mining operations were begun.

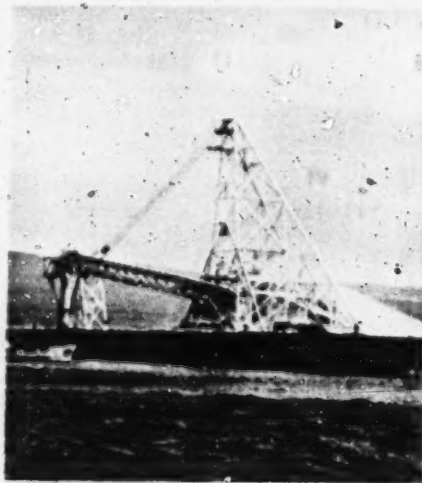
**MARKETING ACTIVITIES.** Alcomex, S. A., a subsidiary company manufacturing and selling extruded and tubular products in Mexico, continued to increase

its marketing activities and to improve its operating and manufacturing efficiency during the year 1958.

Alcoa has negotiated with the Furukawa Electric Company of Japan to establish a jointly owned fabricating company to be known as Furukawa Aluminum Company (Furalco) to make aluminum sheet, extrusions and castings. The arrangement provides for Alcoa's obtaining one-third of the new company's capital stock and providing technical advice on a royalty basis. Approval of the proposal by the Japanese government is required before the negotiations can be concluded.

In November, the directors of The British Aluminum Company Limited, offered to sell 51 million shares of authorized, but as yet unissued, common stock of their company to Alcoa in order to obtain capital funds for future expansion and market development as well as the technical and marketing assistance of Alcoa. This offer was accepted by your management, subject to approval of the British Treasury. Before the purchase was completed, however, control of British Aluminum changed hands, and Alcoa thereupon withdrew, believing this course of action to be in the best interests of its shareholders.

*Dock facilities at Cabo Razo, Dominican Republic, which will be used for shipment of Dominican bauxite to the United States.*





N. R. ALTHAUSEN



F. J. CLOSE



B. J. FLETCHER



R. O. KEEFER

## ORGANIZATIONAL CHANGES

At a meeting of the board of directors of Aluminum Company of America held April 17, 1958, four new vice presidents were elected. They are N. R. Althausen, controller; F. J. Close, in charge of sales development and commercial research divisions; B. J. Fletcher, general manager of engineering; R. O. Keefer, general purchasing agent.

Upon the retirement of D. Wilcox, vice president in charge of product sales and distribution, on February 1, 1959, Lewis P. Favorite was elected as his successor. Mr. Favorite had been manager of product sales.

John S. Harrison, formerly assistant to the vice president in charge of personnel and industrial relations, was named general manager, personnel, on January 3, 1958.

The name of The Aluminum Cooking Utensil Company, Inc., a wholly owned subsidiary of Alcoa, was changed to Wear-Ever Aluminum, Inc., on January 22, 1958. Robert L. Becker, president of this Alcoa subsidiary, was also elected president of Wear-Ever International, Inc., effective December 31, 1958, succeeding Errett M. Grable, who retired.

L. B. Kuhns, formerly assistant chief engineer of Alcoa, became chief engineer on February 1, 1958.

John L. Fleming, formerly assistant director of public relations, was named general manager of public relations on February 1, 1958.

Harry L. Smith, Jr., vice president in charge of sales development and commercial research divisions, retired June 30, 1958.

In a reorganization of Alcoa's foreign operations, John M. Mitchell, formerly president of Eko-Alcoa Containers Inc., was elected president of Alcoa International, Inc., and became general manager of the new international division of Aluminum Company of America on July 1, 1958.

Smelting operations at Badin, N. C., were transferred to Alcoa from Carolina Aluminum Company, a wholly owned subsidiary, effective July 1, 1958. Power generating and transmission facilities serving the Badin smelter are retained in Carolina Aluminum Company, renamed Yadkin, Inc.

The board of directors of Alton and Southern Railroad, a wholly owned subsidiary of Alcoa, elected James Davies to the position of chairman of the board, effective August 1, 1958. He was succeeded as president by Robert K. Heineman, formerly Alcoa's director of industrial relations, and vice president of the subsidiary since January 1, 1958.

Upon the retirement of Herman E. Bakken, vice president and general manager of the refining division on October 1, 1958, the refining division was placed under the supervision of Lawrence Litchfield, Jr., formerly vice president and general manager of the mining division, whose new title is vice president in charge of raw materials and refining divisions. At the same time, J. R. Fox was named general manager of the refining division and G. W. Streeply was made general manager of the raw materials division.

In a move to reorganize and broaden the scope of the company's research and development programs, Alcoa's internal network of technical advisory committees was combined under more unified direction. T. W. Bossert, former chief metallurgist for Alcoa, became the new, full-time chairman of the company's expanded research and development committee on November 12, 1958. As committee chairman, Mr. Bossert succeeds G. D. Welty, manager of engineering sales for Alcoa, who retired November 1, 1958. Concurrent with the new appointment, J. H. Alden was named the first full-time secretary of the committee and J. W. Hood was appointed to the position of chief metallurgist of the company.

## PERSONNEL AND INDUSTRIAL RELATIONS

For all Alcoa personnel, 1958 was a year of intense effort to meet the problems resulting from reduced business activity and increased competition. Efforts to improve costs and organizational effectiveness received a cooperative and constructive response at all levels.

Conferences on creative thinking techniques, designed to sharpen problem-solving skills and generate new ideas, were started at several additional works during 1958 and are producing financial savings. Other management development efforts emphasized job improvement through coaching and regular performance reviews. Education and training programs stressed cost improvement and the need for more attention to employee communication.

The relatively few people added to the company during the year were carefully selected and placed. Recruitment of college graduates was concentrated primarily on research and sales personnel.

Alcoa's interest in safety and insistence on safe practices again were recognized by the National Safety Council, which presented awards to several of our plants for reduced injury rates during 1958.

The Alcoa Savings Plan For Salaried Employees has

provided an incentive and an effective way for such employees to acquire a stock interest in the company as well as a convenient method to save. Under its provisions, salaried employees are permitted to invest up to a maximum of 8 per cent of their salary in the savings plan. Participants may invest either 100 per cent in U. S. Savings Bonds or 50 per cent in such bonds and 50 per cent in Alcoa common stock. The company contributes an amount equal to 50 per cent of the participant's savings, which is invested in Alcoa common stock. The plan was approved at the shareholders annual meeting on April 17, 1958. As of December 31, 1958, approximately 83 per cent of the eligible employees were participating.

Alcoa's three-year agreements with its major unions which were entered into in 1956 provided for additional wage and fringe benefit improvements in 1958. These labor agreements expire on July 31, 1959. There were no major strikes or work stoppages during the year, and our employee and union relations showed the results of effective communication and improved understanding of employees' interests and management objectives and responsibilities.

## HONORS

An award for chemical engineering achievement was presented in January to Alcoa by *Chemical Engineering* magazine, for meritorious contributions to the extractive metallurgy of the Atomic Age.

Broadcasting industry's top honor for public service in the highway safety field — the Alfred P. Sloan Award — was presented to Alcoa on May 6 in recognition of the *Alcoa Hour* television program, "No License to Kill."

R. O. Keefer, vice president and general purchasing agent, was awarded the J. Shipman Gold Medal on May 13 by the National Association of Purchasing Agents for his achievements in standardization.

Howard J. Rowe, chief metallurgist of Alcoa's fabricating division, was awarded the William H. McFadden Gold Medal of the American Foundrymen's Society on May 19 for his "outstanding contributions to the society and the light metals branch of the casting industry."

I. W. Wilson, chairman of the board of Alcoa, was awarded an honorary degree of Doctor of Commercial Science from Duquesne University on June 1. He was re-elected to the board of trustees of the National Industrial Conference Board in April, and was awarded an honorary degree of Doctor of Laws from Washington and Jefferson College on June 7.

Leon E. Hickman, vice president and general coun-

sel of Alcoa, was awarded an honorary Doctor of Laws degree from Western Maryland College, on June 2. He was elected president of the Association of General Counsel on October 21 and named chairman of the American Bar Association's Committee on Corporate Law Departments in the Association's Section on Corporation, Banking and Business Law.

Ralph B. Derr, chief chemical engineer of Alcoa's refining division, was awarded an honorary degree of Doctor of Science by Bucknell University on June 9.

Arthur V. Davis, honorary chairman of Alcoa, received an honorary degree of Doctor of Laws from Carnegie Institute of Technology on June 10.

H. C. Erskine, vice president in charge of smelting and fabricating operations, received a Distinguished Alumnus Award from Pennsylvania State University on June 14.

Edgar H. Dix, Jr., retired assistant director of research for Alcoa, was awarded the Distinguished Public Service Award on November 6 for his outstanding contributions to the Navy in the fields of scientific research and development. Mr. Dix was awarded an honorary degree of Doctor of Science from Carnegie Institute of Technology on June 10.

Frank L. Magee, president of Alcoa, received an honorary degree of Doctor of Laws from Maryville College on September 16.

## FINANCIAL REVIEW OF 1958

**Revenues and Net Income**

Gross revenues for the year 1958 amounted to \$758,143,787 compared with 1957 gross revenues of \$875,461,218. Net income for 1958 amounted to \$42,885,230 in comparison with the 1957 net income of \$75,568,461. The decrease in both gross revenues and net income was due to the substantially lower rate of activity in the aluminum industry generally, which became noticeable during the latter part of 1957 and continued through 1958. Accordingly, Alcoa limited its 1958 production of primary aluminum to 520,000 tons as compared with 712,000 tons produced in 1957.

Early in the year a price decline in the world alu-

minum market adversely affected prices in the domestic industry. Consequently, the price of aluminum pig was reduced by two cents per pound on April 1, 1958, which was immediately followed by a decrease in prices of mill and other fabricated products. On August 1, 1958, when certain contractual wage increases became effective, the price of pig was increased \$0.007 per pound and was followed by various upward adjustments in prices of certain mill and fabricated products. These adjustments, however, were insufficient to offset the effect of wage increases and other rising costs resulting from a lower sales volume and decreased operating rates.

**Dividends**

Regular quarterly dividends on the common stock in a total amount of \$24,756,077.10 were paid during 1958 as follows:

Dividend Number	Record Date	Payment Date	Amount Per Share
74	2/14/58	3/10/58	\$0.30
75	5/20/58	6/10/58	0.30
76	8/20/58	9/10/58	0.30
77	11/21/58	12/10/58	0.30

Preferred stock quarterly dividends paid during the year were \$0.9375 each and aggregated \$2,474,688.94 or \$3.75 per share.

**Capital Expenditures**

The \$600,000,000 capital expenditure program, initiated and carried forward in 1956 and 1957, continued throughout 1958 at reduced construction rates, and completion dates for certain components of the program were extended from those originally planned. Consequently, the 1958 capital expenditures were limited to \$81,599,867. This amount, when added to capital expenditures in 1956 and 1957, totals \$428,410,941 expended for capital additions and betterments of the previously announced \$600,000,000 program. Although the program was

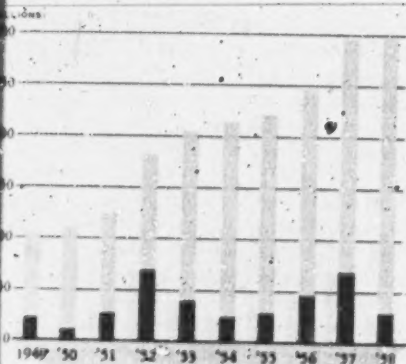
extended, no part has been canceled, and the rate of completions of the various components was rescheduled to coincide with the anticipated future demand for the use of the facilities. Not all of the capital expenditures included in the expansion program are authorized, and there remain unexpended balances of presently authorized projects of \$39,600,000.

It is anticipated that capital expenditures in 1959 will approximate \$65,000,000, which will include preliminary construction expenditures in connection with the previously announced \$150,000,000 Brokopondo Development in Suriname, S. A.

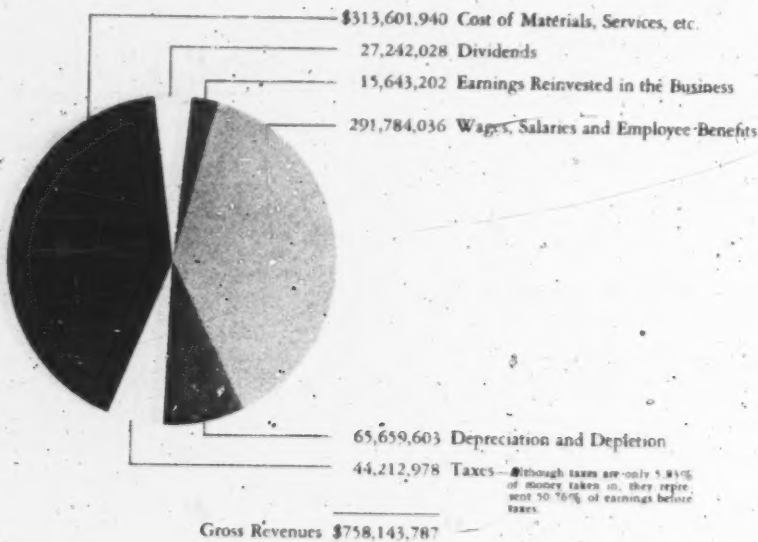
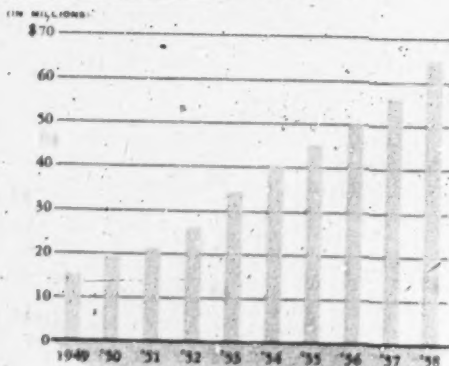


CAPITAL EXPENDITURES

PROPERTIES, PLANTS AND EQUIPMENT



DEPRECIATION AND DEPLETION



Although taxes are only 5.84% of money taken in, they represent 50.16% of earnings before taxes.

**Long-Term Debt**

During the first quarter of 1958, the company increased its short-term borrowings under the Bank Credit Agreement of August 1, 1957, from \$55,000,000 on December 31, 1957, to a total of \$80,000,000. This agreement provided for short-term borrowings up to a maximum of \$125,000,000, which could be converted on or before August 20, 1958, into term notes ranging in maturities from one to three years. The company decided early in 1958 to refinance the term loan agreement by means of a public issue of debentures. Accordingly, \$125,000,000 of 25-year sinking fund debentures, due April 1, 1983, carrying an interest coupon of 3 $\frac{7}{8}$ %, were sold as of April 1, 1958, at a price of 99.60. The net proceeds were used to retire the \$80,000,000 outstanding short-term bank notes, and the balance was added to working capital

to be used for capital expenditures and other corporate purposes.

During 1958, the company acquired and submitted to the trustee for cancellation \$10,000,000 principal amount of its 3 $\frac{1}{8}$ % debentures due February 1, 1964, in satisfaction of the mandatory sinking fund requirement in that amount due January 31, 1959. The company also acquired and submitted to the trustee for cancellation \$3,650,000 principal amount of its 3% debentures due June 1, 1979, which, together with previous acquisitions, satisfied the mandatory sinking fund payment due May 31, 1959, in the amount of \$4,150,000.

The annual installment of \$2,500,000 due January 1, 1959, on the 2.5% note was paid December 31, 1958. The following table details the mandatory debt retirement schedule of outstanding long-term debt as of December 31, 1958.

(In Thousands of Dollars per Year)

	Debentures				Notes		Annual Total
	3 $\frac{1}{8}$ % Due 1964	3% 1979	4 $\frac{1}{4}$ % 1982	3 $\frac{1}{8}$ % 1983	2.55% 1967	3% 1973	
1959	None	None	\$ 5,200	.....	None	.....	\$ 5,200
1960	\$10,000	\$ 4,150	5,200	\$ 5,200	\$ 2,500	.....	27,050
1961	10,000	4,150	5,200	5,200	2,500	.....	27,050
1962	10,000	4,150	5,200	5,200	2,500	.....	27,050
1963	10,000	4,150	5,200	5,200	2,500	.....	27,050
1964	12,500	4,150	5,200	5,200	2,500	.....	29,550
1965	.....	4,150	5,200	5,200	2,500	.....	17,050
1966	.....	4,150	5,200	5,200	2,500	.....	17,050
1967	.....	4,150	5,200	5,200	2,500	.....	17,050
1968	.....	4,150	5,200	5,200	.....	.....	14,550
1969/1973	.....	4,150	5,200	5,200	.....	\$12,000	26,550
1974/1978	.....	4,150	5,200	5,200	.....	.....	14,550
1979	.....	4,550	5,200	5,200	.....	.....	14,950
1980/1981	.....	.....	5,200	5,200	.....	.....	10,400
1982	.....	.....	5,400	5,200	.....	.....	10,600
1983	.....	.....	.....	5,400	.....	.....	5,400
Total Long-Term Debt	\$52,500	\$83,400	\$125,000	\$125,000	\$20,000	\$60,000	\$465,900

**Employees' Stock Option Plan**

At the annual meeting on April 17, 1952, the shareholders authorized the company to reserve 1,956,292 shares (adjusted to give effect to the stock split-ups in 1953 and 1955) of its authorized but un-

issued common stock for the granting of options to employees. The purpose of the plan was to provide an incentive to key employees to become shareholders, thereby attaining a proprietary interest in the future development of the company. These options permit

to purchase common stock from the companies no lower than 95 per cent of the fair value at the dates the options are granted. On a total of 193,000 shares were issued to on March 7, 1958, at 100 per cent of the between the high and low sales prices on the Stock Exchange on that date. These emad received options on the same number of July 24, 1956, at 95 per cent of the market that date. However, the business decline and drop in stock prices defeated the purpose of options, and all but one option, covering

150 shares, were either surrendered to the company upon issuance of the 1958 series or were canceled or expired without being exercised.

On January 1, 1958, there were 536,308 shares of the company's common stock reserved for future options; and on December 31, 1958, the shares so reserved totaled 537,508, the increase representing 1,200 shares on which outstanding options were canceled or expired during the year and thereby made available for future options.

The following table details pertinent information with respect to options outstanding in 1958:

	Options Granted			
	3/15/52	2/26/54	7/24/56	3/7/58
Option price	\$17.6875	\$29.375	\$117.25	\$68.50
Shares subject to unexercised options at January 1, 1958	89,052	92,186	193,850	None
Shares under options issued March 7, 1958	None	None	None	193,000
Shares purchased during 1958	21,577	12,867	None	2,994
Shares canceled or expired during 1958	None	None	700	500
Shares surrendered	None	None	193,000	None
Shares subject to unexercised options at December 31, 1958	67,375	79,319	150	189,506

### Sources and Application of Funds

Cash flow during 1958, as briefed in the table below, resulted in a material increase in working capital from \$187,708,303 on December 31, 1957 to \$293,035,238 at the end of 1958.

Net income	\$ 42,885,230
Depreciation and depletion	65,659,603
Other	1,841,410
Total from operations	\$110,386,243
Proceeds from sale of	
3 7/8% Sinking Fund Debentures, net	\$123,046,628
Common stock	966,470
	124,013,098
	\$234,399,341
Additions to properties, plants and facilities, less net retirements of \$7,789,425	\$ 73,810,442
Payments on long-term debt	16,464,600
Cash dividends:	
Preferred stock	\$ 2,474,680
Common stock	24,767,339
	27,242,028
Other—principally increase in receivables and advances—noncurrent	11,655,336
Increase in working capital	129,152,406
	\$105,246,935

ALUMINUM COMPANY OF AMERICA  
and consolidated subsidiaries

## CONSOLIDATED BALANCE

## ASSETS

December 31

## Current Assets:

Cash	\$ 52,939,341	\$ 39,963,229
United States Treasury Bills, at cost	25,025,389	—
Accounts and notes receivable:		
Customers, less allowances: 1958, \$2,370,000; 1957, \$2,357,000	88,158,405	99,935,757
Other	4,031,552	4,086,596
Inventories (Note A)	209,865,782	231,726,354
Prepaid insurance and taxes	5,290,195	4,066,725
Total Current Assets	385,310,664	379,778,661

## Investments, at cost:

Subsidiaries not consolidated	3,092,844	3,974,205
Other	25,933,183	26,203,231
Total Investments	29,026,027	30,177,436

## Other Assets and Deferred Charges:

Indemnity and surety deposits	1,119,680	1,063,229
Receivables and advances—noncurrent	19,024,741	11,444,633
Deferred exploration and mining expenses	3,055,348	3,222,952
Other deferred charges	7,363,717	5,654,228
Total Other Assets and Deferred Charges	30,543,486	21,385,042

## Properties, Plants and Facilities, at cost:

Land and land rights, including mines	57,522,324	54,352,986
Structures, machinery, equipment and other facilities	1,430,155,227	1,264,265,792
	1,487,677,551	1,318,618,778
Less, accumulated allowances for amortization, depletion and depreciation	669,819,950	615,332,051
	817,857,601	703,286,727
Construction work in progress	73,031,662	179,422,993
Patents and other intangible assets, less amortization	1,489,080	1,517,784
Total Properties, Plants and Facilities	892,378,343	884,227,504
	\$1,337,258,520	\$1,315,568,645

The appended notes are an integral part of the financial statements.

## SHEETS December 31, 1958 and 1957

## LIABILITIES

December 31

## Current Liabilities:

Notes payable to banks	\$ —	\$ 57,144,772
Accounts payable	29,606,824	44,609,844
Dividends on preferred and common stock	7,430,827	7,419,565
Accrued salaries, wages, vacation allowance and other compensation	19,085,140	21,531,558
Provision for taxes, including taxes on income	24,921,608	54,269,383
Other current liabilities	5,444,838	6,777,064
Long-term debt due within one year	5,786,189	238,172
Total Current Liabilities	92,275,426	191,990,358

Long-Term Debt, less amount due within one year (Note B)	462,697,480	358,919,526
Deferred Credits, Reserves and Noncurrent Liabilities	11,396,500	9,172,951
Reserve for Future United States Taxes on Income	83,748,249	84,954,615
	650,117,655	645,037,450

## SHAREHOLDERS' EQUITY

## Capital Stock:

Serial Preferred Stock, par value \$100 per share:		
Authorized 1,000,000 shares:		
\$3.75 Cumulative Preferred Stock, redeemable at \$100 per share:		
Authorized 660,000 shares; issued 659,909 shares	65,990,900	65,990,900
Common Stock, par value \$1.00 per share:		
Authorized 50,000,000 shares:		
Issued: 1958, 20,644,966 shares; 1957, 20,607,428 shares	20,644,966	20,607,428
Additional Capital	35,392,800	34,463,868
Retained Earnings	565,112,199	549,468,997
Total Shareholders' Equity	687,140,865	670,531,193
	\$1,337,258,520	\$1,315,568,645



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**ALUMINUM COMPANY OF AMERICA**  
and consolidated subsidiaries

**STATEMENT OF Consolidated Income and Retained Earnings**

For the years ended December 31, 1958 and 1957

	1958 ▼	1957 ▲
Net sales and operating revenues.....	\$ 753,140,254	\$ 869,378,093
Income from securities and investments.....	1,660,425	1,988,103
Other income, including adjustments applicable to prior years.....	3,343,108	4,095,022
Gross revenues.....	<u>758,143,787</u>	<u>875,461,218</u>
Cost of goods sold and operating expenses.....	493,397,744	551,095,531
Selling, general administrative and other expenses.....	92,340,999	93,468,310
Provision for depreciation and depletion.....	63,659,603	57,658,506
Interest expense.....	17,647,233	14,643,746
Taxes, not including social security and United States and foreign taxes on income....	12,712,978	14,026,664
Total costs and expenses.....	<u>683,758,557</u>	<u>730,892,757</u>
Income before United States and foreign taxes on income.....	74,385,230	144,568,461
Provision for United States and foreign taxes on income.....	31,500,000	69,000,000
Net income for the year.....	<u>42,885,230</u>	<u>75,568,461</u>
Retained earnings, beginning of year.....	549,468,997	501,103,551
	<u>592,354,227</u>	<u>576,672,012</u>
Dividends declared:		
On preferred stock—\$3.75 per share.....	2,474,689	2,474,689
On common stock—\$1.20 per share.....	24,767,339	24,728,326
	<u>27,242,028</u>	<u>27,203,015</u>
Retained earnings, end of year.....	<u>\$ 565,112,199</u>	<u>\$ 549,468,997</u>

**STATEMENT OF Consolidated Additional Capital**

For the years ended December 31, 1958 and 1957

	1958 ▼	1957 ▲
Additional capital, beginning of year.....	\$ 34,463,868	\$ 33,423,544
Excess of amounts received over the aggregate par value of common stock issued under Employees' Stock Option Plan.....	928,932	1,040,324
Additional capital, end of year.....	<u>\$ 35,392,800</u>	<u>\$ 34,463,868</u>

The appended notes are an integral part of the financial statements.

**Notes to consolidated financial statements**

**NOTE A.** Inventories are carried at the lower of cost or market, with cost being determined for substantially all inventories under the last-in first-out method. A classification of the inventories follows:

	December 31	
	1958	1957
Finished goods .....	\$ 52,714,027	\$ 54,547,769
Work in process .....	112,945,245	126,482,204
Bauxite and alumina .....	17,840,222	19,779,645
Purchased raw materials .....	15,107,509	15,589,256
Operating supplies .....	11,258,779	15,327,480
	<u>\$209,865,782</u>	<u>\$231,726,354</u>

**NOTE B.** Long-term debt comprises:

	December 31	
	1958	1957
Sinking fund debentures:		
3½%, due February 1, 1964 .....	\$ 52,500,000	\$ 62,500,000
3%, due June 1, 1979 .....	83,400,000	87,050,000
4½%, due January 1, 1982 .....	125,000,000	125,000,000
3½%, due April 1, 1983 .....	125,000,000	—
Notes payable:		
2.55%, due January 1, 1967 .....	20,000,000	22,500,000
5%, due December 1, 1975 .....	60,000,000	60,000,000
Other .....	2,583,669	2,107,698
Total long-term debt .....	<u>468,483,669</u>	<u>359,157,698</u>
Less, amount due within one year included in current liabilities .....	<u>5,786,189</u>	<u>238,172</u>
	<u>\$462,697,480</u>	<u>\$358,919,526</u>

**NOTE C.** Under an agreement made in 1953, and subsequently amended, the company has contracted to purchase primary aluminum from a Canadian corporation during the years 1959 through 1962 at the current market price in the United States at the time of shipment. Based upon the quoted market price at December 31, 1958, the amount of this commitment was approximately \$84 million. The company has the option to postpone delivery of approximately \$21 million of the above shipments for periods up to a maximum of five years by purchasing aluminum certificates which require the payment of one-half of the then current market price of the primary aluminum involved. Also, the company and the Canadian corporation both have the right to cancel approximately \$13 million of the shipments.

Under an agreement made in 1955 with a Norwegian corporation, the company has contracted to advance, over a period of years, approximately \$20 million and deliver about 760,000 metric tons of alumina to that corporation, with repayment to be made in primary aluminum. At December 31, 1958, approximately \$13 million had been advanced and 50,000 metric tons of alumina delivered under the

agreement. The repayment made in primary aluminum on account of the alumina delivered amounted to the equivalent of approximately 40,000 metric tons of alumina at December 31, 1958.

**NOTE D.** The various retirement plans for hourly rated and salaried employees provide that the cost of the plans will be borne entirely by the company and participating subsidiary companies through annual contributions to trust funds. These consist of actuarially determined contributions for current service and (until the estimated cost of benefits for past service shall have been fully funded) of contributions for past service in such amounts as the boards of directors deem advisable. In general, the plans provide for monthly pensions upon retirement at or after age 65 or upon earlier disability, incapacity or special circumstances. The amount of pension depends upon length of service, remuneration and the amount of certain social security and other benefits.

Amounts included in costs and expenses under the retirement plans amounted to approximately \$9.2 million for 1958 and approximately \$12 million for 1957. Of these amounts, approximately \$1.2 million represented payments for employees' past service. At December 31, 1958, the unfunded amount of past service costs, based upon an actuarial estimate, was approximately \$9.5 million.

The Alcoa Savings Plan for Salaried Employees, begun on a preliminary basis on November 1, 1957, was approved by the shareholders at their annual meeting in 1958. Under the trustee plan, eligible salaried employees may save, depending upon length of service, from two to eight per cent of their salaries, and the company contributes one-half of the employees' savings. Each employee may choose whether all of his savings will be invested in U. S. Savings Bonds or one-half in such bonds and the other half in the company's common stock, but the company contribution must be invested in the company's common stock. The company contribution to the plan amounted to approximately \$2.4 million for 1958 and approximately \$400,000 for the period from November 1, 1957 to December 31, 1957.

**NOTE E.** Reference is made to the sections of this Annual Report titled "To the Shareholders of Alcoa" and "Financial Review of 1958" for information with respect to the proposed acquisition of the net assets of Rome Cable Corporation, capital expenditures and commitments related thereto, long-term debt and the employees' stock option plan.

**ALUMINUM COMPANY OF AMERICA**  
*and consolidated subsidiaries*
**TEN-YEAR SUMMARY**

Year Ended December 31,

**Earnings**

	1958	1957	1956	1955	1954
Gross Revenues	\$758,143,787	\$875,461,218	\$869,783,315	\$848,745,207	\$713,004,925
Cost of Materials, Services, etc.	313,601,940	332,229,358	307,704,742	320,561,827	279,403,298
Wages, Salaries and Employee Benefits	291,784,036	326,978,229	323,902,506	294,726,544	264,236,167
Depreciation and Depletion	65,659,603	57,658,506	50,770,834	45,114,035	40,653,031
Taxes	44,212,978	83,026,664	97,786,200	100,741,993	66,837,274
Net Income	42,883,230	75,568,461	89,621,033	87,600,808	61,875,155
Preferred Stock Dividends	2,474,689	2,474,689	2,474,690	2,474,691	2,474,692
Common Stock Dividends	24,767,339	24,728,326	24,642,644	21,376,494	16,058,638

**Financial Position**

Net Working Capital	293,035,238	187,788,303	189,630,821	224,558,265	182,698,781
Properties, Plants and Facilities, Net	892,378,343	884,227,504	744,655,958	664,993,115	640,865,349
Investments and Other Assets, Net	48,173,013	42,389,527	31,898,547	25,199,889	32,829,608
Long-Term Debt	462,607,480	358,919,526	273,281,901	308,372,943	336,350,713
Future Income Taxes	83,748,249	84,954,615	71,832,224	51,242,931	33,769,919
Shareholders' Equity	687,140,865	670,551,193	621,071,201	555,135,395	486,273,106

**Other Data**

<b>*Per Share of Common Stock</b>					
Net Income	1.96	3.55	4.24	4.18	2.95
Dividends Declared	1.20	1.20	1.20	1.05	.80
Taxes	2.14	4.03	4.76	4.94	3.32
Equity	30.09	29.34	27.01	24.00	20.90
<b>Number of Shareholders</b>					
Preferred Stock	3,911	4,010	4,093	4,228	4,282
Common Stock	23,715	23,295	20,499	16,029	11,625
Capital Expenditures	81,599,867	207,500,256	139,310,818	79,521,316	67,151,034
Number of Employees (average for year)	44,281	54,640	58,486	56,774	54,652

\*Per share amounts have been adjusted where applicable to give effect to stock split-ups in 1953 and 1955, and are based on the number of shares outstanding at the end of the year.

[fol. 4602]

1,073,898	\$584,005,750	\$539,615,017	\$481,167,050	\$346,588,954
8,885,592	218,860,571	193,770,755	193,137,582	145,321,368
1,637,895	230,218,277	199,107,427	170,861,943	143,121,905
4,047,688	26,087,475	21,657,123	19,492,910	15,719,607
6,007,508	61,477,139	85,227,418	50,818,024	21,533,211
0,495,215	47,362,488	39,852,294	46,856,597	20,892,863
2,474,694	2,474,694	2,474,694	2,474,694	2,474,694
5,720,917	14,682,042	13,449,516	9,781,466	9,781,466
9,730,069	98,635,365	68,397,626	126,417,275	97,103,960
1,102,391	545,337,283	379,597,615	325,920,249	316,608,574
5,407,289	78,033,939	36,790,518	34,971,904	32,933,740
1,704,024	323,940,671	123,570,223	146,301,717	140,239,000
7,231,644	4,747,035	566,456	—	—
1,304,281	391,318,881	360,649,080	341,007,711	306,407,274
2.95	2.29	1.91	2.27	.94
.80	.75	.69	.50	.50
3.86	3.14	4.36	2.60	1.10
18.76	16.61	15.06	14.06	12.29
4,478	4,553	4,628	4,788	4,831
10,784	9,901	9,558	9,286	9,036
407,886	198,338,289	79,710,625	34,690,610	68,624,738
58,376	52,120	49,320	46,044	40,331

COMMON STOCK of Aluminum Company of America is listed on the New York Stock Exchange.

PREFERRED STOCK of Aluminum Company of America is admitted to trading on the American Stock Exchange.

**AUDITORS' REPORT**

TO THE SHAREHOLDERS AND  
BOARD OF DIRECTORS,  
ALUMINUM COMPANY OF AMERICA:

We have examined the consolidated balance sheet of Aluminum Company of America and consolidated subsidiary companies as of December 31, 1958, and the related statements of consolidated income and retained earnings and additional capital for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying consolidated financial statements present fairly the financial position of Aluminum Company of America and consolidated subsidiary companies at December 31, 1958, and the results of their operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

LYBRAND, ROSS BROS. & MONTGOMERY

Pittsburgh, Pa.  
February 3, 1959

**REGISTRARS**

**COMMON STOCK**  
Pittsburgh: Fidelity Trust Company  
New York: Guaranty Trust Company of New York  
**PREFERRED STOCK**  
Pittsburgh: Fidelity Trust Company  
New York: Bankers Trust Company

**STOCK TRANSFER AGENTS**

**COMMON STOCK**  
Pittsburgh: Mellon National Bank & Trust Company  
New York: Bankers Trust Company  
**PREFERRED STOCK**  
Pittsburgh: Mellon National Bank & Trust Company  
New York: First National City Trust Company

Aluminum Company of America is incorporated in the Commonwealth of Pennsylvania.

[vol. 46(3)]

ALCOA

## PLANTS AND PRODUCTS



ALCOA-TENN. pig and ingot, sheet, plate, foil, powder and paste, welded tube, iron-casting equipment



BADEN, N.C. pig and ingot

BAKERS, ARK. alumina, alumina chemicals

BIRMINGHAM, TENN. castings, (sand, permanent mold, plaster process), ingot

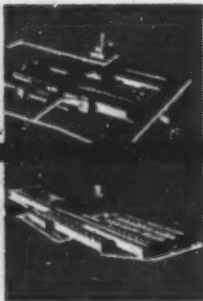
CHICAGO, ILL. die castings

CHILICOTHE, OHIO cooking utensils

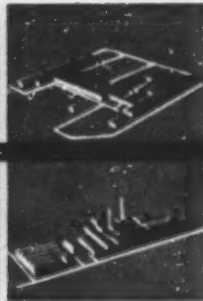
CLEVELAND, OHIO castings (sand, permanent mold, plaster process), forgings, ingot



CRANSTON, R.I. aluminum, impact extrusions, ingot



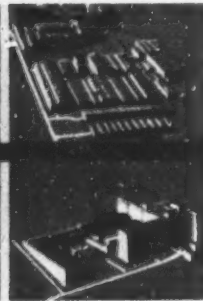
DAVENPORT, IOWA sheet, plate, foil



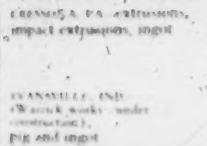
DETROIT, MICH. castings (permanent mold, plaster process), ingot



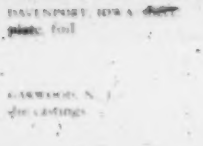
EAST LOCK, ILL. chemicals, fluorides, gallium, calcium, aluminum, cement, desiccants



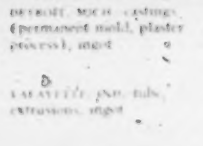
ELMWOOD, N.Y. sheet, plate, foil, impact extrusions



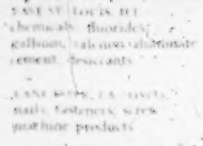
EVANSVILLE, IND. water works (under construction), pig and ingot



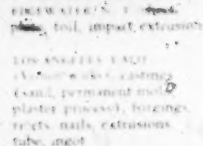
GARWOOD, N.J. die castings



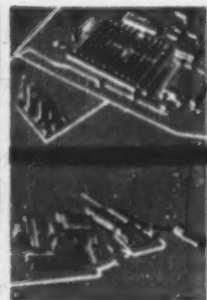
LAFAYETTE, IND. tube, extrusions, ingot



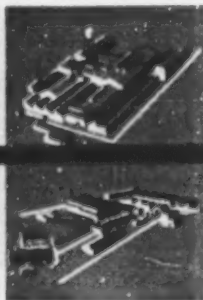
LANE, WISC. nails, fasteners, screw machine products



LOS ANGELES, CALIF. water works, castings (sand, permanent mold, plaster process), forgings, rivets, nails, extrusions, tube, ingot



MAMEIA, N.Y. pig and ingot, wire, rod, bar, cable, cable accessories, structural shapes



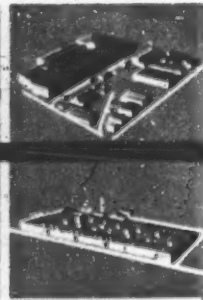
MOBILE, ALA. alumina, alumina chemicals



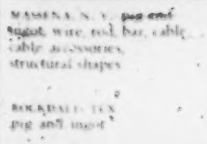
NEW KENSINGTON, PA. tube, extrusions, foil, powder and paste, cooking utensils, rubber products, ingot, fittings



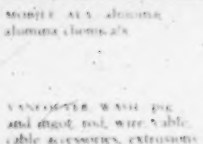
POINT COMFORT, TEX. pig and ingot, alumina



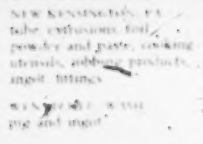
RICHMOND, IND. bottle and jar closures, collapsible tubes



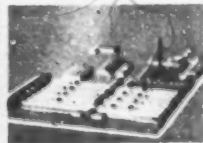
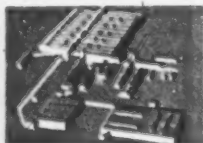
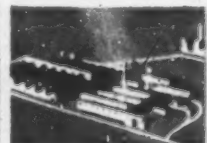
ROCKDALE, TEX. pig and ingot



VANCOUVER, WASH. pig and ingot, rod, wire, cable, cable accessories, extrusions



WENATCHEE, WASH. pig and ingot





[fol. 4604]

**ALUMINUM COMPANY OF AMERICA****MINING LOCATIONS**

Bauxite, Arkansas  
 Cabo Rojo, Dominican Republic  
 David, Republic of Panama  
 Evansville, Indiana  
 Houston, Texas  
 Moengo, Suriname  
 Paramaribo, Suriname

Point Comfort, Texas  
 Port of Spain, Trinidad, B.W.I.  
 (Bauxite Transfer Station)  
 Rockdale, Texas  
 Rosiclare, Illinois  
 San Jose, Costa Rica  
 St. Martinville, Louisiana

**RESEARCH LABORATORIES**

Chicago, Illinois  
 Cleveland, Ohio  
 East St. Louis, Illinois  
 Massena, New York  
 New Kensington, Pennsylvania

**DISTRICT SALES OFFICES**

Atlanta, Georgia  
 Boston, Massachusetts  
 Buffalo, New York  
 Chicago, Illinois  
 Cincinnati, Ohio  
 Cleveland, Ohio  
 Dallas, Texas  
 Detroit, Michigan  
 Hartford, Connecticut  
 Kansas City, Missouri  
 Los Angeles, California  
 Milwaukee, Wisconsin  
 Minneapolis, Minnesota  
 Newark, New Jersey  
 New York, New York  
 Philadelphia, Pennsylvania  
 Pittsburgh, Pennsylvania  
 St. Louis, Missouri  
 San Francisco, California  
 Seattle, Washington  
 Toledo, Ohio  
 Washington, D. C.

**BRANCH SALES OFFICES**

Akron, Ohio  
 Albany, New York  
 Allentown, Pennsylvania  
 Baltimore, Maryland  
 Birmingham, Alabama  
 Bridgeport, Connecticut  
 Charlotte, North Carolina  
 Chattanooga, Tennessee  
 Columbus, Ohio  
 Davenport, Iowa  
 Dayton, Ohio  
 Denver, Colorado  
 Evansville, Indiana  
 Fort Wayne, Indiana  
 Garden City, New York  
 Grand Rapids, Michigan  
 Houston, Texas  
 Indianapolis, Indiana  
 Jackson, Michigan  
 Louisville, Kentucky  
 Memphis, Tennessee  
 Miami, Florida  
 New Orleans, Louisiana  
 Oklahoma City, Oklahoma  
 Omaha, Nebraska  
 Peoria, Illinois  
 Pontiac, Michigan  
 Portland, Oregon  
 Providence, Rhode Island  
 Richmond, Virginia  
 Rochester, New York  
 San Diego, California  
 South Bend, Indiana  
 Spokane, Washington  
 Springfield, Massachusetts  
 Syracuse, New York  
 Tampa, Florida  
 Wichita, Kansas  
 Wilmington, Delaware  
 Worcester, Massachusetts  
 York, Pennsylvania  
 Youngstown, Ohio

**RESIDENT SALES OFFICES**

Aberdeen, South Dakota  
 Boise, Idaho  
 Des Moines, Iowa  
 Lafayette, Indiana  
 Little Rock, Arkansas  
 Nashville, Tennessee  
 Phoenix, Arizona

**DISTRIBUTORS**

Adam Metal Supply, Inc.  
 Long Island City, New York  
 Adam Metal Supply of New Jersey, Inc.  
 Elizabeth, New Jersey  
 Aluminum Products Hawaii, Ltd.  
 Honolulu, Hawaii  
 Brace-Mueller-Huntley, Incorporated  
 Buffalo, New York  
 Rochester, New York  
 Syracuse, New York  
 A. M. Castle & Co.  
 Nottingham Steel & Aluminum Div.  
 Cleveland, Ohio  
 Central Steel and Wire Company  
 Chicago, Illinois  
 Cincinnati, Ohio  
 Detroit, Michigan  
 Milwaukee, Wisconsin  
 The Corey Steel Company  
 Chicago, Illinois  
 Diacommet Metals & Supply Co.  
 Berkeley, California  
 Los Angeles, California  
 Phoenix, Arizona  
 San Diego, California  
 Eastern Metal Mill Products Company  
 Roxbury, Massachusetts  
 Eastern Metals Warehouse, Inc.  
 Albany, New York  
 Edgcomb Steel Company  
 Charlotte, North Carolina  
 Greensboro, North Carolina  
 Philadelphia, Pennsylvania  
 York, Pennsylvania  
 Edgcomb Steel of New England, Inc.  
 Nashua, New Hampshire  
 Slatersville, Rhode Island  
 Edgcomb Steel of New England, Incorporated  
 Milford, Connecticut  
 Henry B. List  
 New York, New York  
 Hinkle Supply Company, Inc.  
 Birmingham, Alabama  
 Jones & Laughlin Steel Corporation  
 Kenilworth, New Jersey  
 Manhattan Brass & Copper Company  
 New York, New York  
 Marsh Steel Corporation  
 Denver, Colorado  
 North Kansas City, Missouri  
 Wichita, Kansas

**Metal Goods Corporation**

Dallas, Texas  
 Denver, Colorado  
 Houston, Texas  
 Memphis, Tennessee  
 New Orleans, Louisiana  
 North Kansas City, Missouri  
 St. Louis, Missouri  
 Tulsa, Oklahoma  
 Wichita, Kansas

**Metal Supply Company**

Philadelphia, Pennsylvania

**Metal Supply, Inc.**

Rockester, New York

**Miller Steel Company, Inc.**

Hillside, New Jersey

**Ohio Metal & Manufacturing Company**

Dayton, Ohio

**Pacific Metal Company**

Boise, Idaho

Portland, Oregon

Seattle, Washington

**Pacific Metals Company, Ltd.**

Los Angeles, California

Salt Lake City, Utah

San Francisco, California

**Sachs Metal Supply Company**

Rochester, New York

**Steel Sales Co. of Indiana Inc.**

Indianapolis, Indiana

**Steel Sales Co. of Michigan**

Detroit, Michigan

**Steel Sales Co. of Minnesota**

Minneapolis, Minnesota

**Steel Sales Co. of Missouri, Inc.**

St. Louis, Missouri

**Steel Sales Co. of Wisconsin**

Milwaukee, Wisconsin

**Steel Sales Corporation**

Chicago, Illinois

**Strahs Aluminum Company, Inc.**

New York, New York

**The J. M. Tull Metal & Supply Co. Inc.**

Atlanta, Georgia

Birmingham, Alabama

Greenville, South Carolina

Jacksonville, Florida

Miami, Florida

Tampa, Florida

**Whitehead Metals, Inc.**

Baltimore, Maryland

Buffalo, New York

Cambridge, Massachusetts

Harrison, New Jersey

New York, New York

Philadelphia, Pennsylvania

Syracuse, New York

Windsor, Connecticut

**Williams and Company, Incorporated**

Cincinnati, Ohio

Cleveland, Ohio

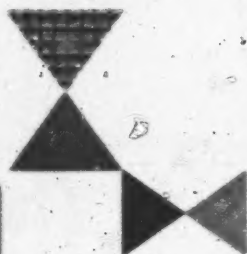
Columbus, Ohio

Louisville, Kentucky

Pittsburgh, Pennsylvania

Toledo, Ohio

(Tel. 4605)



ALUMINUM COMPANY OF AMERICA, 1230 ALCOA BUILDING, PITTSBURGH 19, PENNSYLVANIA

[fol. 4606] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 17

# Annual Report

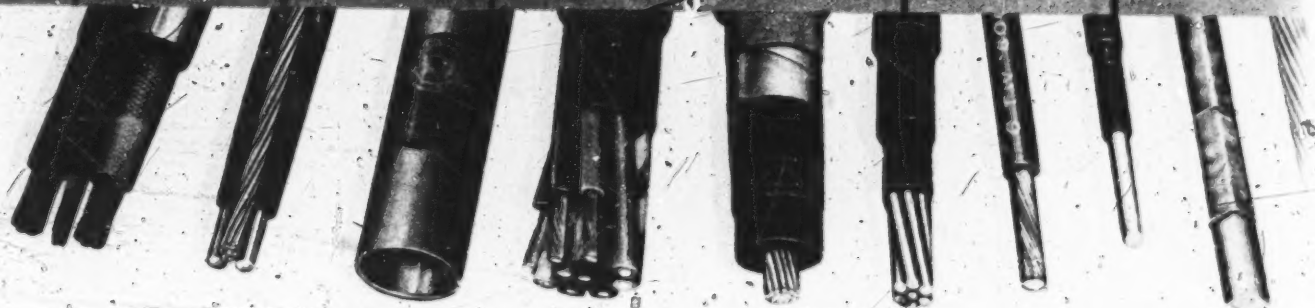
as of March 31, 1953

## Rome Cable Corporation

# Seventeen Years of Progress

	Net Sales	Inventories	Net Working Capital	Net Investment in Plant	Total Capital Invested	Book Value Per Share of Common Stock*	Total Taxes	Net Earnings
1937	\$1,798,000	\$563,000	\$821,000	\$892,000	\$1,762,000	\$3.52	\$16,000	\$2,000
1938	4,957,000	643,000	812,000	947,000	1,833,000	3.66	65,000	71,000
1939	5,371,000	872,000	1,061,000	952,000	2,083,000	4.16	97,000	245,000
1940	6,081,000	988,000	1,141,000	1,084,000	2,306,000	4.61	123,000	298,000
1941	9,465,000	1,452,000	2,021,000	1,144,000	2,636,000	5.27	331,000	432,000
1942	11,632,000	1,146,000	2,314,000	1,159,000	3,124,000	6.24	1,051,000	592,000
1943	12,712,000	1,523,000	2,228,000	1,301,000	3,359,000	6.71	874,000	368,000
1944	16,910,000	1,566,000	2,404,000	1,288,000	3,698,000	7.39	1,619,000	467,000
1945	22,798,000	1,675,000	2,397,000	1,519,000	4,055,000	8.11	1,692,000	487,000
1946	16,975,000	2,645,000	3,420,000	1,720,000	4,338,000	8.67	760,000	399,000
1947	18,436,000	3,296,000	4,720,000	2,957,000	7,150,000	14.29	1,102,000	1,359,000
1948	25,203,000	3,658,000	3,947,000	4,168,000	7,933,000	15.86	929,000	1,152,000
1949	26,089,000	3,678,000	5,637,000	4,415,000	8,549,000	17.09	961,000	1,116,000
1950	19,603,000	4,007,000	6,206,000	5,254,000	8,761,000	17.51	426,000	302,000
1951	35,143,000	3,611,000	5,895,000	6,302,000	10,295,000	20.58	2,575,000	1,922,000
1952	42,658,000	4,938,000	5,561,000	8,027,000	11,439,000	22.87	5,268,000	1,753,000
1953	54,633,000	5,236,000	6,382,000	8,034,000	12,630,000	25.25	6,021,000	2,008,000
<b>TOTALS</b>	<b>\$350,464,000</b>						<b>\$23,308,000</b>	<b>\$12,375,000</b>

\* Based on 100,000 shares outstanding on March 31, 1953.





# *n Years of Progress*

Net Sales	Investment	Net Working Capital	Net Investment in Plant	Total Capital Invested	Book Value Per Share of Common Stock*	Total Taxes	Net Earnings	Net Earnings Per Share of Common Stock*	Cash Dividends Paid	Salaries, Wages and Other Compensation
1,798,000	\$563,000	\$821,000	\$892,000	\$1,762,000	\$3.52	\$16,000	\$2,000	—	—	\$257,000
4,937,000	643,000	812,000	947,000	1,833,000	3.66	63,000	71,000	\$ .14	—	577,000
5,371,000	872,000	1,061,000	955,000	2,083,000	4.16	97,000	245,000	.49	—	664,000
6,081,000	988,000	1,141,000	1,084,000	2,306,000	4.61	123,000	298,000	.59	\$76,000	837,000
9,465,000	1,452,000	2,021,000	1,144,000	2,636,000	5.27	331,000	432,000	.86	95,000	1,184,000
1,632,000	1,146,000	2,314,000	1,159,000	3,124,000	6.24	1,051,000	592,000	1.18	114,000	1,745,000
2,712,000	1,323,000	2,228,000	1,301,000	3,359,000	6.71	874,000	368,000	.73	114,000	2,195,000
6,910,000	1,566,000	2,404,000	1,288,000	3,698,000	7.39	1,619,000	467,000	.93	114,000	3,363,000
2,798,000	1,875,000	2,397,000	1,519,000	4,055,000	8.11	1,692,000	487,000	.97	161,000	4,073,000
6,975,000	2,645,000	3,420,000	1,720,000	4,338,000	8.67	760,000	399,000	.80	114,000	3,530,000
8,436,000	3,296,000	4,720,000	2,957,000	7,150,000	14.29	1,102,000	1,359,000	2.72	320,000	4,244,000
5,203,000	3,658,000	3,947,000	4,168,000	7,933,000	15.86	929,000	1,152,000	2.30	361,000	4,981,000
6,089,000	3,678,000	5,637,000	4,415,000	8,549,000	17.09	961,000	1,116,000	2.23	357,000	4,822,000
9,603,000	4,007,000	6,206,000	5,254,000	8,761,000	17.51	426,000	302,000	.60	291,000	3,989,000
5,143,000	3,611,000	5,895,000	6,302,000	10,295,000	20.58	2,575,000	1,922,000	3.84	430,000	5,874,000
2,658,000	4,938,000	5,561,000	8,027,000	11,439,000	22.87	5,268,000	1,753,000	3.50	539,000	7,308,000
4,633,000	5,236,000	6,382,000	8,034,000	12,630,000	25.25	6,021,000	2,008,000	4.01	647,000	8,598,000

APRIL 1941 The German Secret Service  
Planned to Kill

ROME CABLE

# **Total Amount** **IN THOUSANDS OF DOLLARS**

	Year Ended March 31, 1958	FIVE YEAR AVERAGES Years Ended March 31		
		1957	1952	1947
Net Sales . . . . .	\$40,615	\$49,544	\$29,739	\$17,566
Net Earnings . . . . .	1,019	1,771	1,249	616
Cash Dividends Paid . . . . .	725	710	396	165
For Use in the Business, to Provide Improvements	294	1,061	853	451
Depreciation and Amortization . . . . .	858	758	336	187
Added to Plant and Equipment . . . . .	1,935	807	1,378	557
Net Working Capital . . . . .	11,789	8,629	5,449	3,034
Share Owners' Equity . . . . .	16,354	14,154	9,395	4,520
Expenditures for Employee Compensation, Pensions and Insurance . . . . .	9,452	8,773	5,395	3,481

## **Per Share of Common Stock\***

Net Earnings . . . . .	\$ 1.82	\$ 3.17	\$ 2.23	\$ 1.10
Cash Dividends . . . . .	1.30	1.27	.70	.29
For Use in the Business, to Provide Improvements	.52	1.90	1.53	.81
Working Capital . . . . .	21.13	15.47	9.77	5.44
Share Owners' Equity . . . . .	29.32	25.37	16.84	8.10
Expenditures for Employee Compensation, Pensions and Insurance . . . . .	16.95	15.73	9.67	6.24

\*At March 31, 1958 there were 557,802 shares outstanding. The currently outstanding shares were used for the prior five year averages.



The drastic and steady decline in world price of copper, from a high of 54 cents per pound in March 1956 down to approximately 20 cents per pound in early 1958, caused an earlier reduction in incoming order volume in the copper fabricating business than was true of industry generally. As a result, your Company's sales and earnings showed a sizable decline from the previous year.

### Earnings and Financial Condition

Net earnings for the year ended March 31, 1958 were \$1,019,000, equal to \$1.82 per share (557,802 shares outstanding) compared to \$2,256,000, equal to \$4.04 per share in the prior year with the same number of shares outstanding. Our strong cash position at the end of the year is reflected in an increase

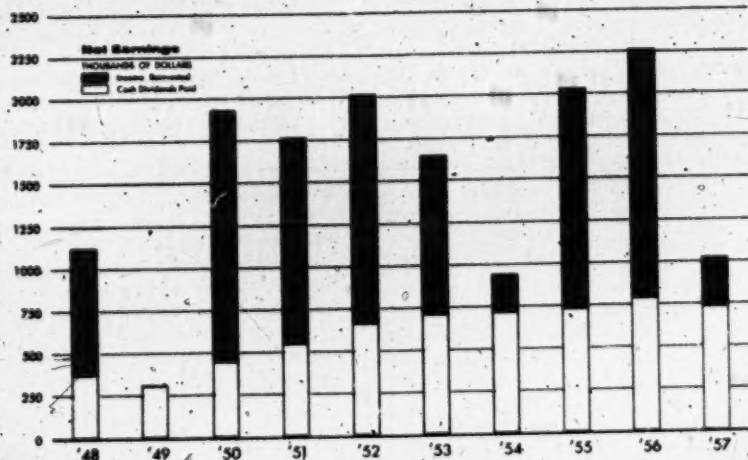
in working capital of \$1,168,000, to a new high of \$11,789,000. Fifty-two cents per share were added to share owners' equity, making the current book value \$29.32 for each share of common stock outstanding, the highest in our twenty-two year history.

Earnings were affected not only by lower volume and higher labor rates, but also by several competitive price cuts which far exceeded reduction in the cost of materials.

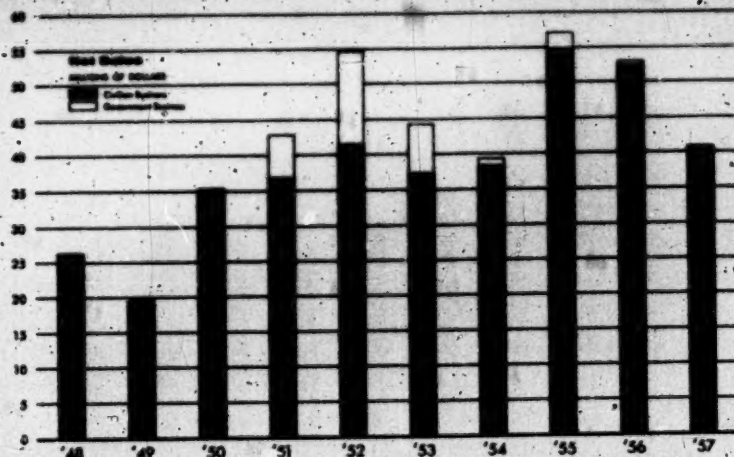
### Dividends

Dividends were paid in the amount of \$1.30 per share, a total amount of \$725,000 during the year.

On May 9, 1958 the Board of Directors declared consecutive dividend No. 77 at the rate of 25 cents, payable on July 1, 1958 to share owners of record June 13, 1958.







## Sales

The dollar value of sales declined twenty-three per cent. Actual physical volume decline was somewhat less as falling copper prices and lower selling prices accentuated the percentage drop between the two years. Inventory liquidation by customers and decline in construction were largely responsible for the decrease.

Order backlogs declined steadily during the year. Since December, however, each month has registered a small but encouraging increase in incoming orders. April orders received were only slightly behind those of a year ago. Recent competitive selling prices in the wire and cable industry compared to those of a decade ago strongly refute government and labor's claims of price increases following wage advances. It is estimated that these unrealistic competitive price reductions affected net earnings in excess of one dollar per share.

## Materials

World prices for copper have remained appreciably below the domestic producer levels throughout the year. Although sizable cutbacks in production

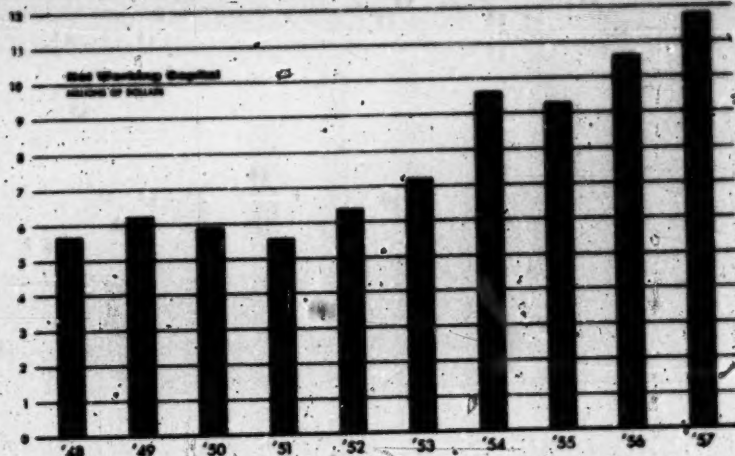
were announced at various times in the past year, U. S. refined production continued in the first quarter of 1958 at the same rate of two years ago, a time when copper fabricators were meeting an unprecedented demand. Present supplies in producers' hands have climbed to a postwar high since new mines and expanded properties have balanced the cutbacks.

Aluminum, steel and other materials are likewise in plentiful supply. Because of foreign competition it is probable that some import tax will be restored to copper after June 30th. This may stimulate some inventory replacement buying.

## Labor

In April 1957 production employees of the Rome plant voted for the first time to have a union, The International Association of Machinists, as their bargaining representative. A contract was negotiated providing mainly the same terms as those previously granted voluntarily by the Company. Negotiations at Torrance with the United Steelworkers Union had similar results.

Employee relations have been harmonious despite a sizable reduction in the working force at Rome due to depressed volume.



### Rome

Our Rome plant which makes wire and cable products suffered most from reduced volume and competitive price cutting, despite impressive reductions in the cost of production. Hand-to-mouth buying on a smaller scale and the multiplicity of items encouraged by the advent of new materials without adequately relinquishing the old required many uneconomical production runs to meet service demands and quality standards of customers. An incentive plan covering all production and maintenance indirect labor employees was installed and is realizing sizable savings.

### Torrance

Our Torrance plant which makes conduit and steel tubing set a new record in sales volume and earnings. The improved earnings, despite increased labor and material costs, reflect the lower unit costs obtainable with increased volume and an aggressive cost reduction program.

Arrangements have been made to purchase five additional acres of land adjacent to our Torrance plant, and a program is well under way to expand our manufacturing facilities so as to be able to produce a broader range of conduit sizes.

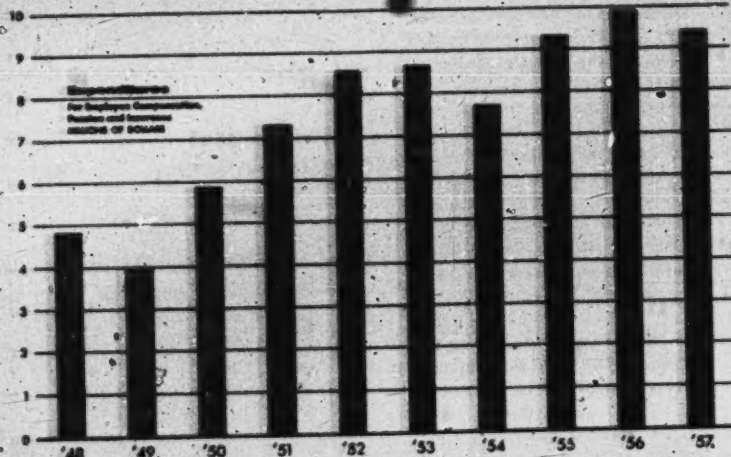
We have increased our participation in the mechanical tube market on the West Coast.

### Cope

This division became a part of our Company at the beginning of the fiscal year as a further part of our policy of diversification to meet better the needs of our customers. Total sales volume set a record for this seventy-two year old Company, and earnings results warrant our faith in its potentialities. Considerable progress was made in the introduction and development of several new products, revamping of selling policies and promotional activities. While the Division is old in years, it has a young progressive organization that already works well with the parent Company.

### Research and Development

In late April 1958 we started moving into our new Research Center, a picture of which is on the cover of this report. With this move in mind, certain technical personnel has been transferred to strengthen our manufacturing department for routine production control, and laboratory personnel has been re-



grouped to permit a greater amount of time for research and development activities. The move to the new laboratory provides space to bring all administrative manufacturing personnel together. The year saw further recognition of our organization's technical abilities and products by increased requests from customers to work on special projects. These involve certain utilities, industrials and government programs of a highly specialized nature, including missile and instrumentation cables. Several significant new patents have been granted. As evidence of the changing and progressive character of our business it is noted that almost forty per cent of the product sales last year were on items that we did not manufacture prior to 1950. We consider the completion of our new Research Center will stimulate future progress in the development of new products, of new and improved processes and practices.

### Capital Expansion

A total of over one million nine hundred thousand dollars was expended for capital improvements. Major outlay included acquisition of our T. J. Cope Division at Collegeville, construction of our new Research Center, expanding our product range at Torrance and new stranding, flat rolling and enamel-

ling equipment at Rome. We started the manufacture of our own diamond dies in Rome during the year. Predicted improvements in quality and cost reductions have already been demonstrated even on reduced operations. Completion of some of the above installations and projected expenditures for the current year should total less than annual depreciation charges. The above planned expansion and rounding out of our product lines should stand us in good stead to meet the changing needs and potential increased demands of the future.

### Long Term Loan

In order adequately to finance our capital expense program detailed elsewhere in the report, in July 1957 we paid off the balance of our former long-term loan amounting to \$3,049,000 and borrowed \$5,000,000 on fifteen year notes. J. P. Morgan & Co. Incorporated participated to the extent of \$1,000,000 for a period of four years at 4¼% interest repayable at the rate of \$250,000 per year. The Connecticut Mutual Life Insurance Company, Hartford, Conn. and Massachusetts Mutual Life Insurance Company, Springfield, Mass. participated equally in the remaining \$4,000,000, and these notes bear interest at the rate of 4¼% to be retired

[fol. 4616]

after the four-year note at the rate of \$300,000 per year until August 1, 1971, with the balance of \$1,000,000 being due August 1, 1972. Provision is made for a sinking fund based on an earnings formula for retiring the insurance company notes at a maximum rate of an additional \$100,000 per year at par starting August 1, 1958.

### New York Stock Exchange

On July 24, 1957 the listing of your Company's shares was transferred from The American Stock Exchange to the New York Stock Exchange.

### Rome Cable Foundation, Inc.

We contributed \$40,000 to Rome Cable Foundation, Inc. compared to \$100,000 a year ago. The Foundation now has resources totalling \$335,000.

From Foundation funds twenty-two additional new scholarships have been granted bringing the total presently in effect to fifty-eight, of which thirty-four have been awards to relatives of employees of the Company.

### Present and Future

As previously stated last year's dip in overall business, which affected our industry and our Company earlier and more severely than most industries, has

slowed our growth trend. In offsetting lowered volume and more competitive pricing, cost reductions exceeding half a million dollars were made. Salary reductions effective May 1st will save an additional several hundred thousand dollars in the current year. This annual report you are reading will cost less than one-third what last year's did. Other steps have already been taken or planned for sizable cost reductions in other elements.

The results achieved at our Torrance and Collegeville plants at a time when our wire and cable products were suffering from lack of volume and low prices emphasize the wisdom of our diversification program. We are also carefully studying our best means of combatting rises in the cost of freight, ever increasing local and state taxes, and other manufacturing costs.

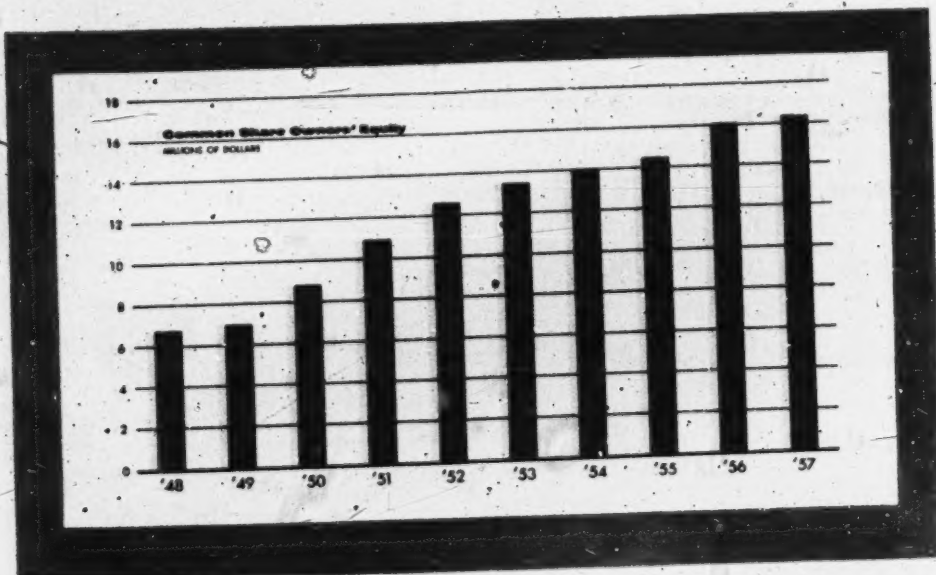
We continue to have faith in the growth of the electrical industry. Our facilities as well as the spirit of our organization should enable us to get our share in that growth.

We wish to thank the entire organization for their cooperation and teamwork during a difficult year.

ON BEHALF OF THE BOARD OF DIRECTORS,

H. T. DYETT, Chairman of the Board  
A. D. R. FRASER, President

May 22, 1958





...that Rome Cable received for its products

Rome Cable received. . . . . \$40,615,000

These receipts were used

To buy copper, steel, aluminum, rubber, plastics,  
textiles, etc. . . . . 23,465,000

To meet expenditures for employee compensation,  
pensions and insurance . . . . . 9,452,000

To pay Federal, State and Local taxes . . . . . 1,673,000

To provide for retiring worn out and obsolete plant  
and equipment . . . . . 858,000

To pay other costs such as power, maintenance,  
supplies, insurance, advertising, interest, etc. . . . . 4,148,000

Leaving

For dividends to Rome Cable share owners . . . . . 725,000

For use in the business, to provide improvements . . . . . 294,000

Distribution of Each Sales Dollar

58¢

Materials

23¢

Employee Compensation,  
Pensions and Insurance

10¢

Services

4¢

Taxes

2¢

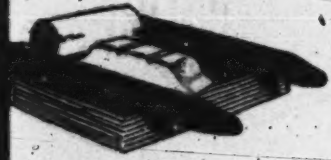
Depreciation

2¢

Dividends

1¢

Maintain the Business



**ASSETS AS OF MARCH 31, 1958****CURRENT ASSETS:**

Cash . . . . .		\$ 4,571,808
Receivables — trade and sundry — less allowance . . . . .		2,691,211
Inventories — Note A		
In process and finished goods . . . . .	\$ 5,397,623	
Raw materials . . . . .	1,180,147	
Manufacturing supplies, etc. . . . .	<u>336,882</u>	6,914,652
Prepaid expenses and sundry supplies . . . . .		<u>565,775</u>
<b>TOTAL CURRENT ASSETS</b> . . . . .		<b>\$14,743,446</b>

**OTHER ASSETS:**

Sundry investments . . . . .	\$ 98,000	
Receivables from employees under stock purchase plan (18,870 shares of Common Stock held as collateral) . . . . .	<u>182,632</u>	280,632

**PLANTS AND EQUIPMENT:**

Land . . . . .	\$ 305,137	
Buildings . . . . .	6,201,103	
Machinery and equipment . . . . .	<u>9,633,023</u>	
Total plants and equipment — at cost . . . . .	<u>\$16,139,263</u>	
Less allowances for depreciation and amortization . . . . .	<u>7,173,697</u>	<u>8,965,566</u>
		<u><b>\$23,989,644</b></u>

**NOTES TO FINANCIAL STATEMENTS**

NOTE A — Inventories are stated generally at cost, and include an amount of \$6,321,765 (over 90%) which was computed by the last-in, first-out method. Total inventory valuation is well below aggregate market prices.

NOTE B — The promissory notes (4 1/4%) provide for additional payments, due each August 1st, limited to \$100,000 for each year, contingent on earnings of the preceding fiscal year, to be applied to the latest maturities of the notes. So long as the notes are outstanding, the Company is required, among other things, to maintain net working capital (excess of current assets over current liabilities) at stipulated amounts. At March 31, 1958, net working capital exceeded such requirement by more than \$4,400,000.

The terms of issuance of the notes place certain restrictions upon the payment of dividends (except stock dividends) and the redemption, retirement or purchase by the Company of its capital shares. At March 31, 1958, the portion of earnings retained in the business not affected by these restrictions was approximately \$2,293,000.

[fol. 4619]

**LIABILITIES AS OF MARCH 31, 1958****CURRENT LIABILITIES:**

Portion of long-term debt payable within one year . . . . .	\$ 350,000
Accounts payable . . . . .	1,116,235
Accrued expenses . . . . .	670,540
Federal taxes on income — estimated . . . . .	817,754
<b>TOTAL CURRENT LIABILITIES . . . . .</b>	<b>\$ 2,954,529</b>

**LONG-TERM DEBT — Note B:**

Promissory note (4¼%), due in semi-annual installments of \$125,000 to August 1, 1961 less \$250,000 due and payable within one year and included above . . . . .	\$ 625,000	
Promissory notes (4¼%), due in annual installments of \$300,000 from August 1, 1962, balance due August 1, 1972, less \$100,000 payable within one year and included above . . . . .	3,900,000	4,525,000

**RESERVE:**

For difference between cost and prices charged to customers for returnable reels, spools and cases . . . . .	156,115
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**CAPITAL INVESTED:****Capital Shares:****Common Stock (\$5 par value) — Note C:**

Authorized 1,200,000 shares; outstanding 557,802 shares; in treasury 34,000 shares; issued 591,802 shares . . . . .	\$ 2,959,010
Additional capital paid in for stock, plus amounts transferred from earnings retained in the business . . . . .	3,285,612
	<u>\$ 6,244,622</u>

**Earnings retained in the business — Notes B and D:**

Unappropriated . . . . .	10,425,822
Appropriated for contingencies . . . . .	450,000
	<u>\$17,120,444</u>

**Less cost of Common Stock in treasury — 34,000 shares**

	<u>766,444</u>	16,354,000
		<u>\$23,989,644</u>

**NOTE C**—At March 31, 1958, 37,800 shares of Common Stock were reserved under a Stock Option Plan for certain key employees. On June 20, 1956, options were granted to 31 officers and key employees, to purchase an aggregate of 34,400 shares of Common Stock at a price equivalent to \$25.57 per share (95% of fair market value at date of grant). The options, none of which had been exercised at March 31, 1958, are exercisable in cumulative annual installments and continue in force for ten years from date of grant. No options were granted during the year ended March 31, 1958.

**NOTE D**—Renegotiation proceedings for years up to the fiscal year ended March 31, 1953 have been concluded. It is believed that any renegotiation refunds which might be required for subsequent years would not materially affect the financial position of the Company at March 31, 1958, or earnings for the year then ended.

**NOTE E**—There is in effect a non-contributory pension plan for the benefit of all regular employees. The unfunded past service cost, at March 31, 1958, was approximately \$2,160,000. During the year, the Company provided \$348,517 under the plan, of which \$130,116 was applicable to past service cost.

[fol. 4620]

**YEAR ENDED MARCH 31, 1958**

Net Sales	\$40,614,730
Cost of products sold (\$34,805,653), distribution, administrative and general expenses (including provision for depreciation and amortization of \$858,193) — Note E	38,316,483
	<u>\$ 2,298,247</u>
Interest expense (\$211,365) less other income — net	202,176
	<u>\$ 2,096,071</u>
Provision for federal taxes on income	1,077,000
<b>NET EARNINGS FOR YEAR</b>	<u><b>\$ 1,019,071</b></u>

(SEE NOTES TO FINANCIAL STATEMENTS ON PAGES 8 &amp; 9)

**YEAR ENDED MARCH 31, 1958****CAPITAL SHARES:**

Balance at March 31, 1958 (no change during year) — Note C: \$ 6,244,622

**EARNINGS RETAINED IN THE BUSINESS — Notes B and D:****Unappropriated:**

Balance at April 1, 1957	\$10,131,893
Add net earnings for year	1,019,071
	<u>\$11,150,964</u>
Deduct cash dividends paid (\$1.30 per share)	725,142
Balance March 31, 1958	<u>\$10,425,822</u>

**Appropriated:**

Balance at March 31, 1958 (no change during year)	450,000	10,875,822
		<u>\$17,120,444</u>

**DEDUCT:**

Cost of 34,000 shares of Common Stock in treasury	766,444
<b>TOTAL CAPITAL INVESTED AT MARCH 31, 1958</b>	<u><b>\$16,354,000</b></u>

(SEE NOTES TO FINANCIAL STATEMENTS ON PAGES 8 &amp; 9)

To The Board of Directors,  
Rome Cable Corporation:

We have examined the financial statements of Rome Cable Corporation for the year ended March 31, 1958. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying statement of financial condition, operating statement and analysis of capital invested present fairly the financial position of Rome Cable Corporation at March 31, 1958, and the results of its operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

New York, New York  
May 6, 1958

*Ernst & Ernst*



[fol. 4621]

**WORKING CAPITAL AND SHARE OWNERS' EQUITY****CURRENT ASSETS:**

	MARCH 31, 1938	MARCH 31, 1937
Cash . . . . .	\$ 4,571,808	\$2,914,326
Receivables — less allowance . . . . .	2,491,211	4,345,212
Inventories . . . . .	6,974,832	7,245,818
Prepaid expenses and sundry supplies . . . . .	363,773	576,692
<b>TOTAL CURRENT ASSETS</b>	<b>\$14,341,646</b>	<b>\$15,082,048</b>

**LESS CURRENT LIABILITIES:**

Portion of long-term debt payable within one year . . . . .	350,000	460,000
Accounts payable and accruals . . . . .	1,786,773	1,967,510
Federal taxes on income — estimated . . . . .	817,754	2,033,249
<b>TOTAL CURRENT LIABILITIES</b>	<b>\$ 2,954,527</b>	<b>\$ 4,460,759</b>

**WORKING CAPITAL (NET CURRENT ASSETS)**

	<b>\$11,788,917</b>	<b>\$10,621,289</b>
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Land, buildings, machinery and equipment, less depreciation  
and amortization . . . . .

8,963,566 7,901,698

Sundry other assets . . . . .

280,632 321,537

**TOTAL WORKING CAPITAL AND OTHER ASSETS**

**\$21,035,115** **\$18,844,524**

**LESS:**

Long-term debt . . . . .	4,525,000	2,589,000
Reserve for returnable reels, spools, and cases . . . . .	156,115	195,453
	<b>\$ 4,681,115</b>	<b>\$ 2,784,453</b>
	<b>\$16,354,000</b>	<b>\$16,060,071</b>

**SHARE OWNERS' EQUITY EVIDENCED BY:**

Common Stock (\$5 par value) Issued 594,802 shares . . . . .	\$ 2,959,010	\$ 2,959,010
Additional capital paid in for stock, plus amounts transferred from earnings retained in the business . . . . .	3,285,612	3,285,612
Earnings retained in the business:	10,423,823	10,131,893
Unappropriated . . . . .	450,000	450,000
Appropriated . . . . .	\$17,120,444	\$16,826,515
Less cost of Common Stock in treasury . . . . .	766,444	766,444
<b>TOTAL SHARE OWNERS' EQUITY</b>	<b>\$16,354,000</b>	<b>\$16,060,071</b>

**ROME CABLE**

## 22 YEARS OF GROWTH AT FORT CARLE

Fiscal Year Ended March 31	Net Sales	Inventories	Net Working Capital	Net Investment in Plant	Total Capital Invested
<b>1957</b>	52,790,000	7,246,000	10,621,000	7,902,000	16,060,000
<b>1956</b>	56,997,000	6,980,000	9,286,000	8,172,000	14,489,000
<b>1955</b>	39,186,000	6,025,000	9,613,000	7,882,000	14,041,000
<b>1954</b>	44,115,000	5,873,000	7,242,000	7,844,000	13,552,000
<b>1953</b>	54,633,000	5,236,000	6,382,000	8,034,000	12,630,000
<b>1952</b>	42,658,000	4,938,000	5,561,000	8,027,000	11,439,000
<b>1951</b>	35,143,000	3,611,000	5,895,000	6,302,000	10,295,000
<b>1950</b>	19,603,000	4,007,000	6,206,000	5,254,000	8,761,000
<b>1949</b>	26,089,000	3,678,000	5,637,000	4,415,000	8,549,000
<b>1948</b>	25,203,000	3,658,000	3,947,000	4,168,000	7,933,000
<b>1947</b>	18,436,000	3,296,000	4,720,000	2,957,000	7,150,000
<b>1946</b>	16,975,000	2,645,000	3,420,000	1,720,000	4,338,000
<b>1945</b>	22,798,000	1,675,000	2,397,000	1,519,000	4,055,000
<b>1944</b>	16,910,000	1,566,000	2,404,000	1,288,000	3,698,000
<b>1943</b>	12,712,000	1,523,000	2,228,000	1,301,000	3,359,000
<b>1942</b>	11,632,000	1,146,000	2,314,000	1,159,000	3,124,000
<b>1941</b>	9,465,000	1,452,000	2,021,000	1,144,000	2,636,000
<b>1940</b>	6,081,000	988,000	1,141,000	1,084,000	2,306,000
<b>1939</b>	5,371,000	872,000	1,061,000	955,000	2,083,000
<b>1938</b>	4,957,000	643,000	812,000	947,000	1,833,000
<b>1937</b>	1,798,000	563,000	821,000	892,000	1,762,000
<b>TOTALS</b>	\$564,167,000				

4623]

Book Value  
Share of  
Common  
StockTotal  
TaxesNet  
Earnings\*Net Earnings  
Per Share of  
Common  
StockCash  
Dividends  
PaidExpenditures  
for Employee  
Compensation,  
Pensions and  
Insurance

28.79	3,042,000	2,256,000	4.04	776,000	9,945,000
25.97	2,823,000	2,023,000	3.62	720,000	9,346,000
25.17	1,307,000	931,000	1.66	709,000	7,709,000
24.29	3,709,000	1,638,000	2.93	698,000	8,696,000
22.64	6,021,000	2,008,000	3.59	647,000	8,598,000
20.50	5,268,000	1,753,000	3.14	539,000	7,308,000
18.45	2,575,000	1,922,000	3.44	430,000	5,874,000
15.70	426,000	302,000	.54	291,000	3,989,000
15.32	961,000	1,116,000	2.00	357,000	4,822,000
14.22	929,000	1,152,000	2.06	361,000	4,981,000
12.81	1,102,000	1,359,000	2.43	320,000	4,244,000
7.77	760,000	399,000	.71	114,000	3,530,000
7.26	1,692,000	487,000	.87	161,000	4,073,000
6.62	1,619,000	467,000	.83	114,000	3,363,000
6.02	874,000	368,000	.65	114,000	2,195,000
5.60	1,051,000	592,000	1.06	114,000	1,745,000
4.72	331,000	432,000	.77	95,000	1,184,000
4.13	123,000	298,000	.53	76,000	837,000
3.73	97,000	245,000	.43	—	664,000
3.28	63,000	71,000	.12	—	577,000
3.15	16,000	2,000	—	—	257,000

\$36,462,000

\$20,840,000

\$37.24

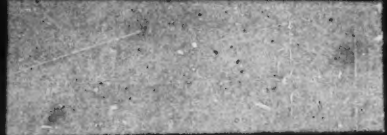
\$7,361,000

\$103,389,000

\*Based on 557,802 shares outstanding on March 31, 1958

ROME CABLE

40241



ROME CABLE  
CONCENTRATION



[fol. 4625] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 23

Question 6

The names and locations of all companies, from whom stock or assets were acquired within the last ten years (i) by Rome and (ii) by Alcoa.

Rome

Acquisitions by Rome are:

T. J. Cope, Inc. (Assets)

Collegeville, Pa.

Andersen-Carlson Mfg. Company (Assets)

Torrance, Calif.

Note: Rome also owns some stock in American Synthetic Rubber Corporation, Louisville, Kentucky and some debentures in Mohawk Airlines, Inc., Utica, New York.

Alcoa

Acquisitions by Alcoa which relate to the business conducted by Rome are:

Aco, Societed Anonima (Stock) (1)

Caracas, Venezuela

D.P.C. plant from War Assets

Massena, N. Y.

Administration (Assets) (2)

(1) Alcoa, through a subsidiary, owns forty-five percent of the stock of Aco. Aco does no manufacturing. It is included here because it sells, among other products, Alcoa electrical conductor.

(2) This is a smelting plant which is now part of Alcoa's Massena Works. It is included because electrical conductor pig, which is made at this plant, is used in making conductor.

[fol. 4626]

## Question 11

For each product listed in your answer to question 9, give the ten principal manufacturers of similar products in the industry and their approximate share of the total sales in the various product categories. To give an accurate account, include not only Rome's and Alcoa's shares in the markets, but also those of foreign manufacturers if applicable.

It is not possible on the basis of available information to assign to individual companies approximate shares of total industry sales for the products listed in the answer to question 9, except for Alcoa and Rome; in many cases it is not even possible to indicate which of the companies manufacturing a given product are the "ten principal manufacturers." We, therefore, have prepared and enclose herewith a list for each product of all manufacturers of that product known to us and have indicated by asterisks the ones we believe are among the first ten. These lists have been compiled from information tabulated by BDSA, reinforced by our knowledge of the industry. In cases where an industry sales figure for a given product is available, we have given Alcoa's and Rome's share of that industry figure.

[fol. 4627]

**Manufacturers of  
Bare Copper Wire & Cable**

- Acme Wire Co.
- American Insulated Wire Corp.
- American Steel & Wire Co.
- Anaconda Company  
(American Brass Co. Subs.)
- Anaconda Company  
(Anaconda Wire & Cable Co. Subs.)
- Belden Mfg. Co.
- Beryllium Corp.  
(Nonotuck Mfg. Co. Subs.)
- Borg-Amphenol Electronics Corp.
- Camden Wire Co.
- Central Cable Corp.
- Cerro de Pasco Corp.  
(Circle Wire & Cable Corp. Subs.)
- Collyer Insulated Wire Co.
- Colorado Fuel and Iron Corp.  
(John A. Roebling's Sons Co. Subs.)
- Consolidated Copper Mines Corp.  
(Rockbestos Products Corp. Subs.)
- Continental Copper & Steel Industries Inc.  
(Hatfield Wire & Cable Co. Div.)
- Copperweld Steel Co.
- Crescent Company
- Crescent Insulated Wire & Cable Co.
- Electric Auto-Lite Co.
- Essex Wire Corp.
- General Cable Corp.
- General Electric Co.
- General Motors Corp.  
(Packard Electric Co. Div.)
- Hudson Wire Co.
- International Telephone & Telegraph Corp.  
(Royal Electric Co., Inc. Subs.)
- International Wire Products Corp.
- Jordan Wire & Cable Co.
- Judd Wire Mfg. Co.
- Kaiser Aluminum & Chemical Corp.

- **Kennecott Copper Corp.**  
(Kennecott Wire & Cable, Div. of the Okonite Co. Div.)
- Kennecott Copper Corp.**  
(Okonite Co., Div.)
- Kerite Company**
- Larabee Wire & Equipment Corp.**
- Miami Copper Co.**  
(Chester Cable Corp. Subs.)
- Narragansett Wire Co.**
- Narragansett Wire Co.**  
(Texas Wire & Cable Co. Div.)
- [fol. 4628] **Neptune Meter Co.**  
(Revere Corp. of America, Subs.)
- Nesor Alloy Product Co.**
- New England Electric Works, Inc.**
- Northern Engineering and Designing Co.**
- Olin Mathieson Chemical Corp.**  
(Southern Electrical Corp., Div.)
- Overlakes Corp.**  
(Lowell Insulated Wire Corp., Subs.)
- **Phelps-Dodge Corp.**  
(Phelps-Dodge Copper Product Corp., Subs.)
- Plastic Wire and Cable Corp.**
- Plastoid Corp.**
- **H. K. Porter Co., Inc.**  
(National Electric, Div.)
- Rea Magnet Wire Co., Inc.**
- Rome Cable Corporation** (Est. 1957 share of total industry sales 2.1%)
- Sequoia Wire & Cable Co.**
- Simplex Wire & Cable Corp.**
- Southwire Company**
- Spargo Wire Company**
- Sprague Electric Company**
- Suprenant Mfg. Co.**
- **Triangle Conduit & Cable Co., Inc.**
- **U. S. Steel Corp.**  
(American Steel & Wire Co., Div.)
- Up-State Wire Co.**



Utica Wire Corp.  
 Walker Brothers  
 Warren Wire Co.  
 Western Electric Co., Inc.  
 Western Insulated Wire Co.  
 Westinghouse Electric Corp.  
 Whitaker Cable Corp.  
 Whitney-Blake Co.

[fol. 4629]

Manufacturers of  
 Copper Communication Wires

Alden Wire Co.  
 American Electric Cable Co.  
 American Enka Corp.—Wm. Brand Co. Inc., Subs.  
 American Enka Corp.—Rex Corp. Subs.  
 American Insulated Wire Corp.  
 Ampere Wire & Cable Corp.  
 • Anaconda Co. (Anaconda Wire & Cable Co., Subs.)  
 • Ansonia Wire & Cable Co., Inc.  
 Belden Mfg. Co.  
 Berkshire Electric Cable Co.  
 Boston Insulated Wire & Cable Co.  
 Colonial Wire & Cable Co.  
 • Colorado Fuel & Iron Co. (John A. Roebling Sons,  
 Subs.)  
 Continental Wire Corp.  
 Essex Wire Corp. (Diamond Wire & Cable Div.)  
 • General Cable Corp.  
 General Cable Corp. (Cornish Wire Co. Inc. Subs.)  
 General Dynamics Corp. (Stromberg Carlson Co. Div.)  
 General Electric Company  
 General Telephone Co. (Automatic Elec. Co. Subs.)  
 General Telephone Co. (Leich Sales Co. Subs.)  
 Holyoke Insulated Wire Co.  
 International Telephone & Telegraph Co. (Kellogg  
 Switchboard & Supply Co. Div.)  
 • International Silver Co. (Times Wire & Cable Co. Subs.)  
 Judd Wire Mfg. Co.  
 • Kennecott Copper Co. (Kennecott Wire & Cable Div. of  
 The Okonite Co. Div.)  
 Lenz Electric Mfg. Co.

- Mohawk Wire & Cable Co.
- Overlakes Corp. (Lowell Ins. Wire Div.)
- Pacific Automation Co.
- Paragon Wire & Cable Corp.
- Phalo Plastics Corp.
- \*Phelps Dodge Corp. (Habirshaw Cable & Wire Co. Div.)
- \*Plastic Wire & Cable Corp.
- Plastoid Corp.
- Rome Cable Corp. (Est. 1957 share of total industry sales 0.1%)
- Runzel Cord & Wire Co.
- Sequoia Wire & Cable Co.
- Southwire Co.
- State Wire & Cable Corp.
- \*Superior Cable Corp.
- Suprenant Mfg. Co.
- Victor Electric Wire & Cable Co.
- \*Western Electric Co. Inc.
- \*Whitney-Blake Co.

[fol. 4630]                      **Manufacturers of**  
**Copper Appliance Wire and Flexible Cords**

- Triple A Wire Works, Inc.
- Advance Ins. Wire Co.
- American Electric Cable Co.
- American Electrical Heater Co.
- \*American Enka Corp.
- (Wm. Brand & Co., Inc. Subs.)
- American Insulated Wire Corp.
- American Wire & Cable Co., Inc.
- Ames Mfg. Corp.
- Anaconda Company
- (Anaconda Wire & Cable Co. Div.)
- Ansonia Wire & Cable Co., Inc.
- Apex Wire & Cable Corp.
- Atlantic Wire & Cable Co.
- \*Belden Mfg. Co.
- Boston Insulated Wire & Cable Co., Inc.
- Cerro de Pasco Corp.
- (Circle Wire & Cable Corp. Subs.)
- Cleveland Insulated Wire Co.

- Coast Cable Corp.
- Collyer Insulated Wire Co.
- Colorado Fuel & Iron Corp.  
(J. A. Roebling & Sons Co. Subs.)
- Consolidated Coppermines Corp.  
(Rockbestos Products Corp. Subs.)
- Continental Steel & Copper Industries, Inc.  
(Hatfield Wire & Cable Co. Div.)
- Continental Wire Corp. of Connecticut
- Corona Insulated Wire Co.
- Crescent Company, The  
(Carol Cable Co. Div.)
- \*Crescent Insulated Wire & Cable Co.
- Dixie Wire Corp.
- Eagle Electric Mfg. Co.
- Eastern Insulated Wire Corp.
- Electric Auto-Lite Co.
- Electric Parts Corp.
- Essex Wire Corp.  
(Carolina Industrial Plastics Corp. Div.)
- Essex Wire Corp.  
(Diamond Wire & Cable Co. Div.)
- \*Essex Wire Corp.  
(Paranite Wire & Cable Co. Div.)
- Gavit Wire & Cable Co.
- \*General Cable Corp.
- \*General Electric Co.
- General Motors Corp.  
(Packard Electric Co. Div.)
- Good-Lite Electric Mfg. Co.
- [fol. 4631] Jemco Insulated Wire Co.
- Hi-Temp Wires, Inc.
- Holyoke Wire & Cable Corp.
- International Silver Co.  
(Times Wire & Cable Co. Subs.)
- \*International Telephone & Telegraph Corp.  
(Royal Electric Corp. Div.)
- \*Kaiser Aluminum & Chemical Corp.
- Kennecott Copper Corp.  
(The Okonite Co. Div.)
- Miami Copper Co.  
(Chester Cable Corp. Subs.)

Montrose Products Co.  
 Narragansett Wire Co.  
 Ohio Wire & Cable Corp.  
 Phalo Plastics Corp.  
 Phelps Dodge Corp.  
 (Habirshaw Cable & Wire Co. Subs.)  
 Philadelphia Ins. Wire Co.  
 Plastic Wire & Cable Corp.  
 Plastoid Corp.  
 H. K. Porter Co., Inc.  
 (National Electric Co. Div.)  
 Radix Wire Co.  
 Rego Insulated Wire Co.  
 Rome Cable Corp. (Est. 1957 share of total industry  
 sales 0.7%)  
 Safety Insulated Wire & Cable Corp.  
 Simplex Wire & Cable Co.  
 Suprenant Mfg. Co.  
 Tech Wire Associates, Inc.  
 Tevco Insulated Wire  
 Triangle Conduit & Cable Co.  
 Trio Wire & Cable Corp.  
 U. S. Steel Corp.  
 (American Steel & Wire Co. Div.)  
 U. S. Wire & Cable Co.  
 Victor Electric Wire & Cable Co.  
 Walker Brothers  
 Waterbury Products Corp.  
 Welcraft Products Co.  
 •Western Insulated Wire Co.  
 Whitaker Cable Corp.  
 •Whitney Blake Co.  
 (Kooled Kords Co. Div.)  
 Woodhead Co.

[fol. 4632]                      Manufacturers of  
                                         Other Copper Insulated Wire & Cable

Ace Wire Mills  
 Acme Wire Co.  
 Advance Insulated Wire Co.



**A-K Mfg. Co.****American Electric Cable Co.****American Enka Corp.****(Wm. Brand & Co. Subs.)****American Enka Corp.****(Rex Corp. Subs.)****American Electric Cable Co.****American Insulated Wire Corp.****Amphenol Electronics Corp.****Ampere Wire & Cable Corp.****\*Anaconda Co.****(Anaconda Wire & Cable Co. Subs.)****Ansonia Wire & Cable Co., Inc.****Apex Wire & Cable Corp.****Atlantic Wire & Cable Co.****Belden Mfg. Co.****Berkshire Electric Cable Co.****Boston Insulated Wire & Cable Co., Inc.****Bradford Kyle & Co.****Bridgeport Insulated Wire****C & W Insulated Wire Co.****Calcon Mfg. Co.****Central Cable Corp.****Cerro De Pasco Corp.****(Circle Wire & Cable Corp. Subs.)****Cleveland Insulated Wire Co.****Coast Cable Co.****Collyer Insulated Wire Co.****Colonial Wire & Cable Co.****Colorado Fuel & Iron Co.****—(John A. Roebling Sons' Co. Subs.)****Columbia Cable & Electric Corp.****Consolidated Coppermines Corp.****(Rockbestos Products Co. Subs.)****\*Continental Copper & Steel Industries, Inc.****(Hatfield Wire & Cable Div.)****Continental Wire Corp. of Connecticut****Corona Insulated Wire Co.****Crescent Co.****Crescent Co. (Carol Cable Co., Div.)****Crescent Insulated Wire & Cable Co.****Dielectric Materials Co.**

**Eastern Insulated Wire Co.**

**Electric Auto-Lite Co.**

**Electric Parts Corp.**

**Essex Wire Corp.**

(Diamond Wire & Cable Co. Div.)

**Essex Wire Corp.**

(Paranite Wire & Cable Co. Div.)

**Essex Wire Corp.**

(Carolina Industrial Plastics Corp. Div.)

**Ettco Wire & Cable Corp.**

**Gavitt Mfg. Co.**

\***General Cable Corp. (Alphaduct Wire & Cable Co. Subs.)**

\***General Cable Corp. (Cornish Wire Co. Subs.)**

\***General Cable Corp. (General Ins. Wire Works, Inc. Subs.)**

\***General Cable Corp. (New England Cable Co. Subs.)**

\***General Electric Co.**

**General Motors Corp.**

(Packard Electric Co. Div.)

**General Telephone Co.**

(Automatic Electric Co. Div.)

**Good, Den, Inc.**

**Good-Lite Electric Mfg. Co.**

**Gordon, Claud S. Co.**

**Hi-Temp Wires, Inc.**

**Holyoke Wire & Cable Corp.**

**Hudson Wire Co.**

**Imperial Wire Co., Inc.**

**International Silver Co.**

(Times Wire & Cable Co. Div.)

**International Tel. & Tel. Corp.**

(Kellogg Switchboard & Supply Co. Div.)

**Judd Wire Mfg. Co.**

\***Kaiser Aluminum & Chemical Corp.**

\***Kennecott Copper Corp.**

(Kennecott Wire & Cable Co. Div. of the Okonite Co. Div.)

**Kerite Co.**

**Kerrigan-Lewis Mfg. Co.**

**Lenz Electric Mfg. Co.**

**Lewis Engineering Co.**

- Magnet Wire Co.
- McGraw-Edison Co.  
(National Elec. Coil Co. Subs.)
- Miami Copper Co.  
(Chester Cable Co. Subs.)
- Miller Electric Co.
- Montrose Products Co.
- Narraganset Wire Co.
- Narraganset Wire Co. (Texas Wire & Cable Co. Div.)
- New England Elec. Works, Inc.
- Olin Mathieson Chemical Corp.  
(Southern Electrical Corp. Div.)
- Oyerlakes Corp.  
(Lowell Insulated Wire Div.)
- Paragon Wire & Cable Corp.
- Phalo Plastics Corp.
- \*Phelps Dodge Corp. (Habirshaw Cable & Wire Corp. Subs.)
- Philadelphia Insulated Wire Co.
- Plastic Wire & Cable Corp.
- Plastoid Corp.
- [fol. 4633] H. K. Porter Co.  
H. K. Porter Co.  
(National Elec. Subs.)
- Radio Wire Mfg. Corp.
- Radix Wire Co.
- Rea Magnet Wire Co., Inc.
- Rego Electric Co.
- Revere Corp. of America (Div. Neptune Meter Co.)
- Rome Cable Corp. (Est. 1957 share of total industry sales 2.0%)
- Royal Electric Co., Inc. (Div. of IT&T Corp.)
- Runzel Cord & Wire Co.
- Sequoia Wire & Cable Co.
- \*Simplex Wire & Cable Corp.
- Slepian, Arthur & Co.
- Southwire Co.
- Sprague Electric Co.
- Standard Wire Co.
- Starring & Co., Inc.
- State Wire & Cable Corp.
- Suflex Corp.

Suprenant Mfg. Co.  
 Tensolite Insulated Wire Co.  
 Tevco Insulated Wire  
 Thermo Electric Co.  
 \*Triangle Conduit & Cable Co., Inc.  
 Trip Wire & Cable Corp.  
 Union Plastics Corp.  
 United States Steel Corp.  
 (American Steel & Wire Co. Div.)  
 U. S. Wire & Cable Co.  
 Vector Mfg. Co.  
 Victor Electric Wire & Cable Co.  
 Viking Wire Co.  
 Walker Brothers  
 Warren Wire Co.  
 Western Electric Co., Inc.  
 Western Insulated Wire Co.  
 Westinghouse Elec. Corp.  
 Wheeler Insulated Wire Co., Inc.  
 Whitaker Cable Corp.  
 Whitney-Blake Co.

[fol. 4634]

Producers of  
E. C. Aluminum Pig and Ingot

Alcoa  
 Aluminium Limited  
 Anaconda Company  
 Harvey Aluminum Company  
 Kaiser Aluminum & Chemical Corporation  
 Ormet Corporation  
 Reynolds Metals Company  
 Various Foreign Sources

[fol. 4635]

Manufacturers of  
E. C. Aluminum Redraw Rod

Alcoa  
 Anaconda Company  
 Essex Wire Company  
 General Cable Corporation  
 Kaiser Aluminum & Chemical Corporation  
 Olin Mathieson Chemical Corporation



**Reynolds Metals Company**  
**Rome Cable Corporation**  
**Southwire Company**

**[fol. 4636] Manufacturers of Copper Rods**

**American Brass Company**  
**Anaconda Wire & Cable Company**  
**Circle Wire & Cable Company**  
**Essex Wire Corporation**  
**General Cable Corporation**  
**Kennecott Copper Corporation**  
**Phelps Dodge Copper Products Company**  
**John A. Roebling's Sons Corporation**  
**Rome Cable Corporation**  
**Triangle Conduit & Cable Company**

**[fol. 4637] Manufacturers of  
 Bare Aluminum Wire and Cable and ACSR**

- \*Alcoa (est. 1958 share of total industry sales 31.7%)
- \*Anaconda Co. (The Anaconda Wire & Cable Co.)
- \*Central Cable Corporation
- \*Essex Wire and Cable Company
- \*General Cable Corporation
- \*Kaiser Aluminum & Chemical Corporation
- \*Nehring Electrical Works
- \*Olin Mathieson Chemical Corp. (Southern Electrical Corp.)
- \*Reynolds Metals Company
- Rome Cable Company (est. 1958 share of total industry sales 0.3%)
- \*Southwire Company

**[fol. 4638] Manufacturers of  
 Aluminum Insulated Wire and Cable**

- \*Alcoa (est. 1958 share of total industry sales 11.3%)
- \*Anaconda Co. (The Anaconda Wire & Cable Co.)
- Belden Manufacturing Company
- \*Central Cable Corporation—
- Cerro de Pasco Corp. (Circle Wire & Cable Corp.)

- Collyer Insulated Wire Company
- Crescent Insulated Wire & Cable Company
- Electric Auto-Lite Company
- Essex Wire & Cable Company
- General Cable Corporation
- General Electric Company
- General Motors Corporation (Packard Electric)
- Hendrix Wire & Cable Corporation
- Hudson Wire Company
- Kaiser Aluminum & Chemical Corporation
- Kennecott Copper Corp. (Kennecott Wire & Cable Co., incl. Okonite)
- Kérite Company
- Leviton Mfg. Co. (American Insulated Wire Corp.)
- Narragansett Wire Company
- Nehring Electric Works
- Olin Mathieson Chemical Corp. (Southern Electrical Corp.)
- Plastoid Corporation
- H. K. Porter Company (National Electric Products Corp.)
- Rea Magnet Wire Company
- Reynolds Metals Company
- Roebling's (John A.) Sons Company
- Rome Cable Corporation (est. 1958 share of total industry sales 4.6%)
- Simplex Wire & Cable Company
- Southwire Company
- Suprenant Manufacturing Company
- Triangle Conduit & Cable Company, Inc.
- Walker Brothers
- Western Electric Company
- Westinghouse Electric Corporation

[fol. 4639] Manufacturers of Steel Conduit

- Armco Steel Corp.
- (Spang, Chalfant Div.)
- Cerro De Pasco Corp.
- (Circle Wire & Cable Co. Subs.)
- Clayton-Mark & Co.

**Columbia Cable & Electric Corp.**

**General Cable Corp.**

(Clifton Conduit Co. Div.)

**General Electric Co.**

**Laclede Steel Co.**

**Nikoh Tube Co.**

**Pittsburgh Standard Conduit Co.**

**H. K. Porter Co.**

(National Elec. Div.)

**Republic Steel Corp.**

**Rome Cable Corporation** (Est. 1957 share of total industry sales 2.4%)

**The Steelduct Company**

**Triangle Conduit & Cable Co.**

**Walker Brothers**

**Westmoreland Metal Mfg. Co.**

**Youngstown Sheet & Tube Co.**

[fol. 4640]                      **Manufacturers of  
Cable Accessories for Aluminum Conductor**

**Alcoa**

**Anderson Electric Company**

**Jasper Blackburn Corporation**

**Burndy Engineering Company**

**A. B. Chance Company**

**Dossert & Company**

**James R. Kearney Corporation**

**Ohio Brass Company**

**Penn Union Electric Corporation**

**Reliable Electric Company**

**The Thomas & Betts Company, Inc.**

[fol. 4641] **Manufacturers of Aluminum Conduit**

**Alcoa**

**Kaiser Aluminum & Chemical Corporation**

**Reynolds Metals Company**

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[fol. 4642] Manufacturers of Cable Troughs

Chalfant Products Co.

De Vois Engineering Co.

ETS, Hokin & Galvin Co.

Globe Mfg. Co.

Husky Products Co.

H. K. Porter Co., Inc.

(Delta Star Electric Co., Inc. Div.)

P. W. Mfg. Co.

Rome Cable Corporation



18. Describe the extent, if any, to which (i) Rome and (ii) Rome's competitors, now supply and for the last five years have supplied, materials to Alcoa, listing the products supplied by each and the quantity and dollar volume thereof in each year.

**181 - Extent Name Cable Corporation Supplied Alcoa.**

[illegible]

1844 - Extent Rome Cable Corporation's Competitors Supplied Alcos.

YEAR	PRODUCT CLASSIFICATION				TOTAL VALUE
	Bare Aluminum Wire and Cable	Bare Copper Wire and Cable	Insulated Aluminum Wire and Cable	Insulated Copper Wire and Cable	
1954					
Anaconda			3,000 ft.	10,000 ft.	\$ 4,319
General Cable			1,800 ft.		\$ 2,700
General Electric					
Nehring			94,000 ft.	12,367	\$ 20,011
Okonite (Kennebecott)					
Simplex					
U.S. Rubber (Waisac)			2,750,000 ft.	114,182	\$ 123,746

(11) Rome's competitors, not supply and for the last five years have supplied, materials to Alcoa, listing the products supplied by each and the quantity and dollar volume thereof in each year.

18 11 Continued

YEAR	PRODUCT CLASSIFICATION				4. Insulated Copper			
	1. Bare Aluminum		2. Bare Copper		3. Insulated Aluminum		Wire and Cable	
	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	VALUE	QUANTITY	TOTAL VALUE
1955								
	Anaconda							
	General Cable							
	General Electric							
	Nehring							
	Okonite (Kennecott)							
	Simplex							
	U.S. Rubber (Kaiser)							
1956								
	Anaconda							
	General Cable							
	General Electric							
	Nehring							
	Okonite (Kennecott)							
	Simplex							
	U.S. Rubber (Kaiser)							
1957								
	Anaconda							
	General Cable							
	General Electric							
	Nehring							
	Okonite (Kennecott)							
	Simplex							
	U.S. Rubber (Kaiser)							
1958								
	Anaconda							
	General Cable							
	General Electric							
	Nehring							
	Okonite (Kennecott)							
	Simplex							
	U.S. Rubber (Kaiser)							

**[fol. 4646] IN UNITED STATES DISTRICT COURT  
PLAINTIFF'S EXHIBIT 27**

**Question 3. For each of the years 1953 through 1958 and for each quarterly period in 1959, state:**

**(a) The total quantity and dollar value of aluminum E.C. Redraw Rod manufactured by Rome.**

**Redraw Aluminum Rod Manufactured**

	<b>Total Production</b>	<b>Value*</b>
1953	982,967 lbs.	\$ 290,486
1954	1,818,226	485,406
1955	3,259,250	977,775
1956	4,778,372	1,570,651
1957	3,796,028	1,300,140
1958	3,300,216	1,114,584
1st Q. 1959	946,117	306,069
2nd Q. 1959	1,105,760	357,271

\*Value shown is derived for 1953 and 1954 by multiplying production by annual average market price, because Rome sold no rods for these years, and for other years by multiplying production by annual average sales price.

**(b) The total quantity and dollar volume of aluminum E.C. Redraw Rod purchased by Rome from other companies, giving a breakdown showing the name and address of, and the quantity and dollar volume purchased from each such other company.**

	<b>Purchased Rods</b>	<b>Seller</b>
1953	100,423 lbs.	\$ 26,310 Alcoa
1954	483,845	127,511 Alcoa
	3,982	1,102 Aluminium Ltd. Sales
1956	150,936	43,433 Kaiser Aluminum Co.
1957	442	161 Reynolds Metal Co.

**(c) The quantity and dollar value of aluminum E.C. Redraw Rod used by Rome in the manufacture of wire and cable.**

**Rod Used by Rome Cable Corp. in Manufacture of Wire and Cable**

		<b>Value*</b>
1953	1,083,390 lbs.	\$ 287,098
1954	2,302,686	614,817
1955	3,254,470	976,341
1956	4,790,229	1,574,548
1957	3,378,150	1,157,016
1958	2,972,748	986,061
1st Q. 1959	843,245	272,790
2nd Q. 1959	957,805	309,467

\*Value shown is derived for 1953 and 1954 by multiplying production by annual average market price, because Rome sold no rods for these years, and for other years by multiplying production by annual average sales price.

[fol. 4647] (d) The total quantity and dollar volume of aluminum E.C. Redraw Rod sold by Rome to other companies, giving a breakdown showing (i) the name and address of, and the quantity and dollar volume sold to each such other company and (ii) the quantity and dollar volume of shipments to each state and to Canada.

#### Aluminum Rods Sold

	1953	None	
	1954	None	
	1955	4,780 lbs.	\$ 1,434
	1956	139,079	45,854
	1957	417,878	143,138
	1958	387,468	128,531
1st Q.	1959	102,872	33,275
2nd Q.	1959	147,955	47,799

#### Aerofin Corporation—Syracuse, N. Y.

	1956	124,191	40,641
	1957	341,296	110,530
	1958	372,559	123,261
1st Q.	1959	89,266	28,744
2nd Q.	1959	133,666	43,040

#### Westinghouse Electric Corp. Buffalo, N. Y.

	1955	4,780	1,434
	1956	—	—
	1957	—	—
	1958	4,884	1,627
1st Q.	1959	13,606	4,531
2nd Q.	1959	14,289	4,759

#### Central Cable Corporation—Jersey Shore, Pa.

	1957	65,356	22,613
	1958	10,025	3,643

#### Phillips Electrical Works—Brockville, Canada

	1957	10,074	3,606
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[fol. 4648]

#### Carrier Corporation—Syracuse, N. Y.

	1957	1,152 lbs.	389
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#### General Cable Corporation—Perth Amboy, N. J.

	1956	14,829 lbs.	5,195
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#### Revere Copper & Brass—Rome, N. Y.

	1956	59	18
--	------	----	----

Rod Sales—By State			
1955	New York	4,780 lbs.	\$ 1,434
1956	New York	124,250	40,659
	New Jersey	14,829	5,195
1957	New York	342,448	116,919
	Penna.	65,356	22,613
	Canada	10,074	3,606
1958	New York	377,443	124,888
	Penna.	10,025	3,643
1st Q.	1959	New York	102,872
2nd Q.	1959	New York	147,955
			47,799

[fol. 4649] 13. (a) List the machinery and equipment for the manufacture of rod which can be used interchangeably in the manufacture of aluminum E.C. Redraw Rod and copper rod.

(b) To the extent that machinery or equipment for the manufacture of rod cannot be used interchangeably, please explain what steps would be necessary including the economic factors involved,

(i) to convert machinery or equipment for the making of aluminum E.C. Redraw Rod to machinery or equipment for the making of copper rod;

(ii) to convert machinery or equipment for the making of copper rod to machinery or equipment for the making of aluminum E.C. Redraw Rod; and

(iii) to convert machinery or equipment to make both aluminum E.C. Redraw and copper rod.

(a) None

(b) (i) Equipment cannot be converted

(ii) Copper rod rolling mill could be converted but only upon a basis which would be completely uneconomic. Under present known circumstances, no one would make the decision to do this. Moreover, any such conversion would mean the loss of all copper rod production capacity, since the equipment could not be used interchangeably.

(iii) For the reasons given in (b i) and (b ii) above this would be impossible, impractical or uneconomic.

[fol. 4650] 14. Describe Rome's machinery and equipment used at any time for the manufacture of copper rod which also has been used at any time since January 1, 1953 for the manufacture of aluminum rod.

None



[fol. 4651] 15. (a) List the machinery and equipment for the manufacture of wire and cable which can be used interchangeably in the manufacture of aluminum wire and cable and the manufacture of copper wire and cable.

(b) To the extent that machinery or equipment for the manufacture of wire or cable can be used interchangeably, please explain what steps would be necessary, including the economic factors involved.

(i) to convert machinery or equipment for the making of aluminum wire and cable to machinery or equipment for the making of copper wire and cable;

(ii) to convert machinery or equipment for the making of copper wire and cable to machinery or equipment for the making of aluminum wire and cable; and

(iii) to convert machinery or equipment to make both aluminum wire and cable and copper wire and cable.

(a) Bare Wire—

- (4) Flat Rolling Machines
- (10) Small Larmouth Type Strand-ers
- (5) Large Larmouth Type Strand-ers
- (1) Large Rigid Frame Strander
- (11) New England Butt Bunch Stranders
- (7) Haskell Dawes Bunch Strand-ers
- (1) 61 Bobbin Watson Strander

Magnet Wire—

- (12) Horizontal Cotton and Paper Covering Machines
- (2) 10 Spindle Vertical Cotton Covering Machines
- (1) Heavy Asbestos Covering Machine
- (7) Horizontal Glass Covering Machines
- (1) 8 Spindle Vertical Glass Covering Machine
- (1) Heavy 5 Wire Enamelling Unit
- (1) Heavy 6 Wire Enamelling Unit

- Weatherproof—**
- (4) Cable Braiders
  - (12) Sinfra Knitters
  - (3) Saturating Units
  - (2) Large Finishing Units
  - (1) Small Finishing Unit

- Rubber Covered—**
- (3) 3¼" Rubber Type Insulating Machines
  - (2) 3½" Rubber Type Insulating Machines
  - (4) 4½" Rubber Type Insulating Machines
  - (2) 6" Rubber Type Insulating Machines

[fol. 4652]

- Plastic Dept.—**
- (4) 1½" Plastic Insulating Machines
  - (1) 2½" Plastic Insulating Machines
  - (2) 3¼" Plastic Insulating Machines
  - (3) 4½" Plastic Insulating Machines
  - (1) 6" Plastic Insulating Machines

In addition to the above we have secondary or supplemental equipment or machinery as follows:

- Bare Wire—**
- (17) Electric Annealing Pots
  - (4) Water-Seal Annealing Furnaces
- Magnet Wire—** None
- Weatherproof—** None
- Rubber Covered—**
- (4) Small Wire Twisters
  - (1) Large 37 Bay Cabler
  - (1) 48 Bay Cabler
  - (1) Large 7 Wire Cabler
  - (2) 30" Cord Twisters
  - (1) 44" Cable Twister
  - (1) Reverse Lay Cabler
  - (1) Service Entrance Cable Machine
  - (2) Taping Machines
  - (2) Lead Extruders

- (2) Saturating Machines
- (2) Finishing Machines
- (4) Water Test Tanks
- (4) Horizontal Vulcanizers
- (2) Dome Vulcanizers
- (1) 8 Spindle Lacquer Tower
- (141) Small Braiders
- (7) Cable Braiders
- (2) Rubber Banburys

- Plastic Dept.—
- (2) Non Metallic Sheath Cable Finishers
  - (24) Non Metallic Sheath Cable Braiders
  - (16) Non Metallic Sheath Cable Paper Wrap Machines
  - (8) Striping Machines
  - (1) Small Edmands Twister
  - (1) Large Edmands Twister
  - (3) Water Test Tanks
  - (1) Plastic Banbury

b (i) To convert (1) Heavy Intermediate Aluminum Rod Drawing machine and (1) Heavy Aluminum Rod Drawing machine would necessitate the following:

- (1) A new motor on the Heavy Intermediate Machine—
- (2) A new motor on the Heavy Rod Drawing Machine—
- (3) Change the type of drawing lubricant.

[fol. 4653] Note: Due to the condition of these machines, speeds would have to be reduced to the point where they would be uneconomical to run.

b (ii) Would necessitate changing the type of drawing lubricant on all copper drawing machines:

- (2) Heavy Intermediate Machines
- (4) Light Intermediate Machines
- (4) Heavy Rod Drawing Machines
- (1) Bull Block
- (29) Fine Wire Machines

b (iii) Would have to install a copper drawing lubricant system at the aluminum drawing machines (b (i) above) and would have to install an aluminum drawing lubricant system at the copper drawing machines (b (ii) above). Quality of both copper and aluminum products would be adversely affected.

[fol. 4654] 16. Describe Rome's machinery and equipment, used at any time for the manufacture of copper wire and cable which has also been used at any time since January 1, 1953 for the manufacture of aluminum wire and cable.

Bare Wire— 5 Large Larmouth Type Stranders  
2 Small Larmouth Type Stranders  
1 New England Butt Bunch Strander  
1 Haskell Dawes Bunch Strander

Magnet Wire— Small experimental runs have been made on approximately 6 Horizontal Paper and Cotton Machines.

Weatherproof— (4) Cable Braiders  
(12) Sinfra Knitters  
(3) Saturating Units  
(2) Large Finishing Units  
(1) Small Finishing Unit

Rubber Covered— Detail records are not available but approximately one-half the number of the Rubber Type Insulating Machines have been used at various times.

Plastic Dept.— Detail records are not available but approximately one-half the number of the Plastic Insulating Machines were also used at various times.

Note: In addition to the above, the secondary or supplemental equipment listed in 15 (a) above has also been used at one time or another.

[fol. 4655] 17. Describe the changes, if any, in Rome's production facilities and marketing organization which have been made since March 31, 1959 and the changes which are contemplated.

**Production Facilities**

Changed since March 31, 1959:

- (a) New 6 Spindle Heavy Wire Enamel Unit mentioned 15 (a) above.

Changes which are contemplated:

- (b) (1) 37 Wire Cabler being transferred to Rome Plant from surplus equipment at the Vancouver, Washington Plant (formerly a stranding machine)  
 (2) New double spindle Haskell Dawes Bunch Stranders (replacement).  
 (5) New small Larmouth Type Stranders (one of these is a replacement).

**Marketing Organization**

Since March 31, 1959 five employees, previously associated with the Alcoa marketing organization, have been transferred to the Rome marketing organization. It is expected that, ultimately the Alcoa marketing organization for electrical conductors and conduit will be integrated with the Rome marketing organization and all marketing responsibility for electrical conductors and conduit will be lodged with Rome.

[fol. 4656] IN UNITED STATES DISTRICT COURT  
 PLAINTIFF'S EXHIBIT 28

**Memorandum**

Re: Arrangement Between Rome Cable Corporation  
 and Aluminum Company of America

1. Rome Cable Corporation (hereinafter referred to as Rome Cable) will cover bare aluminum wire furnished by Aluminum Company of America (hereinafter referred to as Alcoa) for the account of Alcoa.

2. Upon Alcoa's request, Rome Cable will, from time to time, quote its prices for processing various sizes of bare aluminum wire with various types of covering. Rome Cable may adjust its quoted prices downward at any time without notice or upward upon thirty five (55) days' notice to Alcoa.

3. Rome Cable is prepared to process 500,000 pounds of



bare aluminum wire with Neoprene and 400,000 pounds of bare aluminum wire with plastic during the balance of the calendar year 1952 and is prepared to process a minimum of 3,000,000 pounds of bare aluminum wire with either type of covering during the calendar year 1953, and a minimum of 1,000,000 pounds during the period January 1-March 31, 1954.

Rome Cable and Alcoa contemplate that Alcoa's requirements for covered wire may increase to such an extent that if Rome Cable is to meet those requirements it will need additional facilities. If Alcoa requests Rome Cable to acquire additional facilities involving a substantial capital investment, Rome Cable will, within thirty (30) days of such request, advise Alcoa as to its decision with regard to making such investment and in the event Rome Cable agrees to make such investment, the period of this arrangement will be extended.

4. The arrangement between Rome Cable and Alcoa shall continue until terminated by either party upon 9 month's notice to the other, provided, however, that the earliest [fol. 4657] termination date shall be April 1, 1954, and provided further that in the event Rome Cable at the request of Alcoa makes a substantial capital investment for the purpose of meeting Alcoa's increasing requirements for covered wire, the period of this arrangement will be extended.

5. Alcoa will designate a representative at its plant at Massena, New York, and a representative at its principal office in Pittsburgh, Pennsylvania. These representatives will have full power and authority to act on behalf of Alcoa in connection with the administration of the arrangement between Alcoa and Rome Cable and Rome Cable will be fully justified in relying wholly on the decisions of, and acting pursuant to the directions of, either of such representatives in any matters pertaining to the carrying out of such arrangement.

Rome Cable will designate a representative at its principal office in Rome, New York, who will have full power and authority to act on behalf of Rome Cable in connection with the administration of the arrangement between Alcoa and Rome Cable and Alcoa will be fully justified in relying wholly on the decisions of, and acting pursuant to the directions of, such representative in any matter pertaining to the carrying out of such arrangement.

[fol. 4658] IN UNITED STATES DISTRICT COURT

## PLAINTIFF'S EXHIBIT 30

Aluminum Company of America  
Pittsburgh 19, Pa.

November 21, 1955.

Mr. Glenn Boston,  
Rome Cable Corporation,  
Rome, New York.

Dear Glenn:

Please refer to my letter to you dated November 4th, 1955. As a result of our subsequent discussions and in the light of the second paragraph of numbered paragraph 3 of the "Memorandum Re: Arrangement Between Rome Cable Corporation and Aluminum Company of America" initialed by Mr. R. V. Davies on March 7th, 1952, we hereby request that Rome Cable Corporation acquire additional facilities for increasing its production for the application of neoprene covering on aluminum wire and cable.

Alcoa has no immediate intention of acquiring similar facilities and hereby gives you assurance that it intends to rely upon Rome Cable Corporation to continue the covering of aluminum wire and cable, as outlined in numbered paragraph 1 of the memorandum, with neoprene for the period ending January 1st, 1957, after which date the period may be extended from time to time by mutual agreement, all provided, of course, that Rome Cable Corporation acquires and maintains ample facilities to handle the order load in accordance with Alcoa's present and future requirements.

Very truly yours, Aluminum Company of America,  
Philip T. Coffin, Manager, Electrical Industry  
Sales.

PTC:ags

[fol. 4659] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 31

Rome Cable Corporation  
Rome, N. Y.

A. D. R. Fraser, President

December 16, 1955.

Mr. Ralph V. Davies, Vice President,  
Aluminum Company of America,  
1501 Alcoa Building,  
Pittsburgh 19, Pa.

Dear Ralph:

In accordance with the request, per Mr. P. T. Coffin's letter of November 21, 1955 to our Mr. G. E. Rolston, we are acquiring additional facilities for increasing our production for the application of neoprene covering on aluminum wire cable. We have already made available to you starting December 1, 1955 sufficient capacity to apply a neoprene covering to 5,700,000 Factor I feet per month and to twist 2,500,000 ft. per month, continuing for the duration of our agreement. With an additional capital investment we will acquire facilities enabling us to make available to you capacity for an additional 1,300,000 feet of neoprene covering starting in May, 1956. In view of the capital investment required, we feel that the agreement should be extended until May 1, 1957.

We suggest that about the year ended 1956, we should consider whether a further extension is mutually desired.

If this letter meets with your approval, we would appreciate it if you will sign and return the enclosed copy.

Sincerely, Ron Fraser, President.

ADRF/m

Approved: Aluminum Company of America, by R. V. Davies, December 26, 1955.

[fol. 4660] Question 20. (a) List the names of companies, other than Alcoa, for whom Rome performed, during the period from January 1, 1953 to date, insulation work on copper or aluminum conductor, whether pursuant to contract or otherwise.

(b) For each such company, give the amount received by Rome for such work during each of the years 1953 through 1958 and each quarterly period of 1959, and describe the arrangements under which such work was performed.

#### Westinghouse Electric Corporation

Year	Amount Received	
1953	\$584,655	Charge generally computed by subtracting copper cost from regular price for finished material.
1954	435,533	
1955	382,220	
1956	477,658	
1957	555,749	
1958	195,657	
1st Q. 1959	45,843	
2nd Q. 1959	47,673	

#### U. S. Government (Griffiss Air Force Base-Rome, N.Y.)

1955	\$ 12,796	Bid Price
1956	317,668	Bid Price

#### Langdon & Hughes Electric Co., Inc., Utica, N.Y.

(Subcontract on Air Force Contract)

1955	\$ 47,817	Bid Price
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#### Allis Chalmers Manufacturing Co.

Pittsburgh, Penna.

1953	\$ 217	Agreed price for service.
1954	2,028	

[fol. 4661] Question 21. Submit all market, industry and company surveys, studies or reports made or considered in anticipation of, or in connection with, the acquisition of Rome by Alcoa or any other company.

None.

[fol. 4662] Question 22. Submit all market, industry and company surveys or reports concerning competition, actual or potential, between aluminum and copper wire and cable.

None.  
[fol. 4663] Question 23. Please supply us with (a) Section 12 of the Rome Product Catalog, entitled "Conductor Materials" and (b) the Rome Cable Manual of Technical Information—Second Edition.

Section 12 of the Rome Product Catalog was reserved for insertion of data referring to "Conductor materials". However no such data have been added to the catalog.

We submit a copy of the Rome Cable Manual of Technical Information—Second Edition.



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[fol. 4664] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 32

Manual of Technical Information  
Second Edition

\$4.50 Per Copy

Copyrighted 1957  
Rome Cable Corporation  
Rome, New York

## Properties of Metals at 20 C

[fol. 4805-4806]

Metal	Specific Gravity	Specific Heat Cal./Gram-Deg C	Melting Point Degrees C	Resistivity Microhm-Cm	Resistivity Ohms (mil, foot)	Temperature Coef. of Resistance per Deg C	Thermal Cond. Cal-Cm/Sec-Deg C-Cm <sup>2</sup>	Thermal Coef. of linear Expansion/Deg C	Tensile Strength Lbs./Sq. In.
Aluminum.....	2.71	0.214	660	2.828	17.00	.00446	0.52	$23 \times 10^{-4}$	24,000
Brass									
Commercial Bronze (90% Cu-10% Zn).....	8.80	0.092	1045	4.96	28.03	.00145	0.45	$18 \times 10^{-4}$	95,000
Low Brass (80 Cu-20% Zn).....	8.67	0.092	995	5.95	35.78	.00114	0.34	$19 \times 10^{-4}$	105,000
High Brass (70% Cu-30% Zn).....	8.53	0.092	930	6.905	41.50	.00098	0.26	$20 \times 10^{-4}$	120,000
Copper									
Annealed Wire (100% Cond).....	8.89	0.0921	1083	1.7241	10.37	.00393	0.92	$17 \times 10^{-4}$	36,000-40,000
Hard Drawn Wire (97.5% Cond).....	8.89			1.7683	10.63	.00383		$14.2 \times 10^{-4}$	50,000-70,000
Gold.....	19.30	0.031	1063	2.42	14.55	.0034	0.71	$11.7 \times 10^{-4}$	50,000
Iron.....	7.86	0.107	1535	10	60.14	.0050	0.16	$28 \times 10^{-4}$	1,800-4,000
Lead.....	11.3	0.031	327	22	132.31	.0039	0.083	$5 \times 10^{-4}$	100,000
Molybdenum.....	10.2	0.061	2025	5.7	34.28	.0033	0.35	$14 \times 10^{-4}$	155,000
Nickel.....	8.9	0.105	1452	7.8	46.91	.006	0.14	$8.9 \times 10^{-4}$	42,000
Platinum.....	21.45	0.032	1773	10.60	63.75	.00300	0.17	$18 \times 10^{-4}$	50,000-70,000
Silver.....	10.5	0.066	960	1.63	9.80	.0038	1.01	$9 \times 10^{-4}$	4,000-5,000
Steel (Mild).....	7.8	0.107	1300-1475	12	72.17	.005	0.11	$21 \times 10^{-4}$	490,000
Tin.....	7.3	0.054	232	11.5	69.16	.0042	0.15	$4 \times 10^{-4}$	7,000-30,000
Tungsten.....	19.3	0.032	3410	5.52	33.20	.0015	0.48	$28 \times 10^{-4}$	
Zinc.....	7.14	0.092	419	.6	36.08	.00347	0.27		

**[fol. 4667] Galvanic Series of Industrial Alloys  
in Sea Water**

**Corroded End (Anodic or least noble)**

Magnesium  
 Magnesium alloys  
 Zinc  
 Aluminum 2S  
 Cadmium  
 Aluminum 17ST  
 Steel or Iron  
 Cast Iron  
 Chromium-Iron (active)  
 Ni-Resist  
 18-8 Stainless (active)  
 18-8-3 Stainless (active)  
 Lead-Tin solders  
 Lead  
 Tin  
 Nickel (active)  
 Inconel (active)  
 Brasses  
 Copper  
 Bronzes  
 Copper-Nickel alloys  
 Monel  
 Silver Solder  
 Nickel (passive)  
 Inconel (passive)  
 Chromium-Iron (passive)  
 18-8 Stainless (passive)  
 18-8-3 Stainless (passive)  
 Silver  
 Graphite  
 Gold  
 Platinum

**Protected End (Cathodic or most noble)**

(a) In general, when determining which of the two materials will be attacked by electrolytic corrosion, the material nearer the bottom of the list will not be corroded and the material nearer the top will be.

(b) Galvanic corrosion will usually take place only if the two materials are in intimate contact and in the presence of a conducting solution, which need be only a thin film of water.

(c) Galvanic action is an area effect, i.e. if a large steel sheet has a copper rivet in it, the steel will be corroded only in the area of the rivet, whereas if a large copper sheet has a steel rivet in it, the steel rivet would be attacked relatively quickly.

(d) Corrosion can occur by galvanic action if a metal is placed in a solution of a metallic salt which is lower in the galvanic series.

[fol. 4668]

## IN UNITED STATES DISTRICT COURT

## PLAINTIFF'S EXHIBIT 33

## Question 1(a)

For each of the years 1953 through 1958 and for each quarterly period in 1959, state: (a) the total quantity and dollar value of aluminum E.C. redraw rod manufactured by Alcoa

	1953		1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
E.C. Redraw Rod Manufactured on Toll Conversion Basis(1)	1,468	109	21,549	756	2,125	148	4,892	366	0	0	0	0	0	0	0	0
E.C. Redraw Rod Manufactured for Sale and for Own Use(2)	102,075	27,050	101,003	26,968	98,102	27,469	89,537	26,562	90,544	30,694	81,168	24,594	20,132	5,816	24,924	7,172
Total E.C. Redraw Rod Manufactured	103,543	27,159	112,552	27,724	100,227	27,617	94,429	26,928	90,544	30,694	81,168	24,594	20,132	5,816	24,924	7,170

- Notes: (1) The value shown for toll conversion E.C. redraw rod represents the price paid for the toll conversion service.  
 (2) The value assigned to E.C. redraw rod manufactured for sale and own use is the annual average revenue from sales in the United States and Canada.



[fol. 4669]

## Question 1(b)

For each of the years 1953 through 1958 and for each quarterly period in 1959, state: the total quantity and dollar volume of aluminum E.C. solder sold by Alcoa (exclusive of sales by its subsidiary, Remco) to other companies, giving a breakdown showing the quantity and dollar volume of shipments to each state and to Canada.

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
Total Sales to Other Companies, by:														
Aluminum Company of America	16,437	4,396	15,037	4,212	16,361	5,218	14,638	4,963	6,978	2,116	3,496	1,010	4,303	1,240
Alcoa International, Inc.	0	0	0	0	0	0	1,798	1,198	1,509	437	0	0	0	0
Total	16,437	4,396	15,037	4,212	16,361	5,218	16,436	6,161	8,487	2,553	3,496	1,010	4,303	1,240
Sales to Each State and to Canada:														
Alabama	2,194	579	849	237	580	188	2,337	797	2,626	844	266	76	0	0
California	860	232	2,684	750	710	226	957	323	1,506	488	702	202	1,116	320
Connecticut	10	2	142	41	64	21	243	83	266	82	83	25	17	5
Florida	0	0	0	0	705	232	355	119	437	125	537	154	361	104
Georgia	0	0	10	3	0	0	100	33	46	15	62	26	55	13
Illinois	2,644	713	1,844	508	1,706	537	3,037	1,016	153	46	0	0	152	44
Indiana	176	52	660	188	363	121	357	136	784	236	279	83	276	80
Maryland	30	8	0	0	0	0	0	0	0	0	0	0	0	0
Massachusetts	112	30	91	26	283	89	181	61	93	28	20	6	51	15
Michigan	280	75	221	61	0	0	0	0	0	0	0	0	0	0
Missouri	2,055	541	401	108	3,566	1,148	1,364	460	102	29	52	15	0	0
Montana	0	0	281	56	0	0	0	0	0	0	0	0	0	0
New Hampshire	30	8	0	0	0	0	0	0	0	0	0	0	0	0
New Jersey	1,676	450	905	261	1,333	421	852	289	372	111	360	103	307	86
New York	1,324	357	2,388	671	319	106	226	79	96	28	185	53	243	71
Ohio	1,760	467	607	170	1,474	462	769	259	0	0	0	0	613	176
Pennsylvania	1,328	355	1,640	459	2,423	767	1,195	400	122	37	30	9	50	15
Rhode Island	1,354	363	1,147	326	966	307	0	0	0	0	0	0	0	0
Tennessee	131	34	1,247	347	1,869	593	0	0	2	1	0	0	0	0
Texas	0	0	0	0	0	0	40	13	371	106	900	258	1,062	304
Canada, by:														
Aluminum Company of America	0	0	0	0	0	0	2,596	895	0	0	0	0	0	0
Alcoa International, Inc.	0	0	0	0	0	0	352	117	0	0	0	0	0	0
Total	0	0	0	0	0	0	2,948	1,012	0	0	0	0	0	0

Notes: (1) Total Aluminum Company of America sales to all companies for 1953 were 26,254,000# and \$6,947,000. No records of 1953 sales by states and Canada are available.

(2) For 1954, records are slightly incomplete. 473,000# and \$130,000 of the total sales cannot be identified by territory.

## Question 2

[fol. 4670]

1549

"Facts for Industry." Series M33-2-08, for release March 18, 1959, Table 2, gives for 1958 a total industry shipments figure of 174,847,000 pounds for "ACSR and aluminum cable, bare". The response to question 10 of our letter of February 2, 1959, gives a total industry sales figure of "Bare Aluminum Wire and Cable & ACSR" in the amount of 178,906,000 pounds.

(a) How may these two figures be reconciled?

(b) Is the answer to question 9 of our letter of February 2, 1959, with respect to "Bare Wire and Cable -- Aluminum & ACSR", limited to conductor wire and cable?

Answer:

(a) Total industry shipments of "Bare Aluminum Wire and Cable & ACSR" shown in the response to Question 10 of the Department of Justice letter of February 2, 1959, included bare E. C. wire. Industry shipments of E. C. wire were not included in the 1957 or 1958 Facts for Industry report of shipments of "ACSR and Aluminum Cable, Bare." As indicated in Note (3) to the response to Question 10, the volume of bare E. C. wire shipments was estimated. The estimate for 1958 was 4,059,000 pounds.

(b) The volumes reported as "Bare Wire and Cable -- Aluminum & ACSR" and "Bare Aluminum Wire and Cable and ACSR" in the response to Question 9 of the Department of Justice letter of February 2, 1959, are of products designated as Electrical Conductor. It should not be implied, however, that these products are always used for the purpose of conducting electricity. Some customers purchase E. C. grade wire for non-electrical applications, such as refrigerator shelves.

For each of the years 1953 through 1958, and for each quarterly period in 1959, (A) state the total quantity and volume of sales by Alcoa (exclusive of sales by its subsidiary, Rose) of each of the following products, and (B) give a breakdown showing the quantity and dollar volume of shipments to each state and to Canada of each such product sold:

## (a) Bare Aluminum Wire and Cable and ACSR

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Found	Dollars	Found	Dollars	Found	Dollars	Found	Dollars	Found	Dollars	Found	Dollars	Found	Dollars
	(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)	
3(A) Total Sales to Other Companies, by:														
Aluminum Company of America	71,101	25,492	68,389	27,149	58,022	26,607	55,602	25,313	56,680	23,663	14,096	5,610	15,358	6,096
Alcoa International, Inc.	0	0	0	0	164	87	3,412	1,621	652	281	0	0	0	0
Total	71,101	25,492	68,389	27,149	58,186	26,774	59,014	26,934	57,332	23,944	14,096	5,610	15,358	6,096
3(B) Sales to each State and to Canada:														
Alabama	765	288	722	324	784	365	632	282	1,709	728	872	341	23	8
Arizona	449	170	135	52	289	133	281	118	787	308	96	35	194	75
Arkansas	793	323	1,344	523	1,07	52	364	168	65	25	4	2	3	1
California	2,932	1,076	4,286	1,651	6,885	2,834	3,819	1,621	6,096	2,236	1,268	462	1,206	442
Colorado	589	260	830	374	1,048	526	1,532	747	533	236	82	36	272	107
Connecticut	29	14	133	60	367	180	265	132	151	64	1	1	77	35
Delaware	345	130	335	116	79	34	3	2	85	36	81	42	29	13
District of Columbia	0	0	64	27	109	50	5	3	2	1	0	0	0	0
Florida	742	299	1,436	633	2,379	1,118	579	266	596	237	2	1	3	1
Georgia	411	165	1,023	412	955	447	838	391	899	377	470	196	328	148
Illinois	317	132	284	92	585	259	1,188	563	1,306	565	67	31	665	193
Indiana	2,093	836	1,474	616	2,606	1,388	2,446	1,172	1,463	627	566	215	77	32
Iowa	2,740	1,232	2,898	1,114	1,537	724	2,066	1,052	6,085	3,376	342	152	796	300
Kansas	361	137	779	327	1,196	569	914	418	965	404	211	93	161	66
Kentucky	185	94	621	270	637	301	543	273	619	256	568	258	40	19
Louisiana	4,809	2,197	1,786	780	1,131	508	1,351	663	1,050	486	15	20	520	206
Maine	570	210	980	388	756	343	1,681	717	810	338	389	145	538	210
Maryland	471	168	601	239	556	260	749	341	319	132	37	14	358	155
Massachusetts	395	153	403	172	647	302	552	254	1,526	552	218	90	489	190
Michigan	821	266	37	17	440	195	122	51	844	312	96	35	125	52
Minnesota	1,647	685	2,233	919	2,756	1,318	832	416	1,430	575	973	355	403	157
Mississippi	1,673	649	703	288	803	367	407	191	785	325	206	82	174	72
Missouri	407	172	750	290	691	302	797	343	933	373	537	222	110	43
Montana	462	190	1,047	426	475	214	934	417	833	354	93	40	351	132
Nebraska	22	10	33	17	40	21	87	47	410	140	2	1	128	52
Nevada	541	234	687	296	439	220	250	127	211	89	26	13	629	276
New Hampshire	199	87	106	47	5	3	15	8	22	9	0	6	0	8
New Jersey	306	114	81	31	217	94	134	61	146	59	15	6	25	10
New Mexico	991	353	1,275	456	2,023	962	1,532	720	1,821	691	285	112	177	64
New York	43	18	22	10	249	127	203	98	0	0	0	0	35	15
North Carolina	1,048	409	2,546	966	3,074	1,294	4,118	1,793	4,144	1,617	1,403	527	770	277
North Dakota	1,420	581	1,380	551	1,046	483	1,485	637	1,549	626	142	56	300	124
Ohio	810	240	695	284	69	34	136	63	149	65	16	6	137	59
Oklahoma	12,706	5,717	4,680	2,026	4,342	2,028	4,328	2,112	2,755	1,060	696	309	1,845	703
Oregon	1,222	568	1,210	501	849	417	1,272	611	925	391	95	36	94	46
Pennsylvania	839	346	2,015	816	1,777	831	1,111	203	1,310	537	282	124	250	67
	3,837	1,118	1,602	611	2,648	1,232	2,477	1,168	2,676	1,140	635	264	852	378



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## Question 3 (Continued)

## (a) Bare Aluminum Wire and Cable and ACM

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
Rhode Island	111	43	194	79	218	99	21	10	61	22	19	7	51	17
South Carolina	111	42	677	267	428	205	374	159	110	48	273	104	126	47
South Dakota	1,619	598	404	167	273	128	161	81	483	218	21	10	25	21
Tennessee	500	181	360	142	201	96	855	409	1,211	523	76	33	199	80
Texas	5,468	1,515	6,629	2,632	5,076	2,342	5,381	2,403	2,269	929	917	354	231	95
Utah	167	72	758	297	765	364	160	78	541	229	24	10	43	19
Vermont	226	94	143	62	201	91	692	244	595	225	26	10	25	10
Virginia	1,055	423	1,837	709	1,101	476	2,439	1,176	952	414	101	41	224	95
Washington	8,408	2,899	6,204	2,149	1,620	636	986	462	1,235	516	643	256	1,558	551
West Virginia	1,267	543	1,885	855	1,212	561	1,164	539	642	264	9	4	36	15
Wisconsin	920	385	1,310	554	1,100	551	1,335	604	1,750	725	580	202	191	68
Wyoming	199	85	113	48	141	72	174	88	63	30	5	2	21	8
Canada, by:														
Aluminum Company of America	0	0	0	0	15	7	0	0	1	1	0	0	0	0
Alcoa International, Inc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	15	7	0	0	1	1	0	0	0	0

Notes: (1) Total Aluminum Company of America sales to all companies for 1953 were \$1,326,000 and \$25,156,000. No records of 1953 sales by states and Canada are available.

(2) For 1954, records are slightly incomplete, and 1,275,000 and \$1,362,000 of the total sales cannot be identified by territory.

[fol. 4673]

## Question 3 (Continued)

## (b) Aluminum Insulated Wire and Cable

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
3(A) Total Sales to Other Companies, by:														
Aluminum Company of America	2,270	1,886	4,010	3,477	4,743	4,248	4,699	4,015	5,766	4,224	1,357	893	1,579	1,085
Alcoa International, Inc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	2,270	1,886	4,010	3,477	4,743	4,248	4,699	4,015	5,766	4,224	1,357	893	1,579	1,085
3(B) Sales to each State and to Canada:														
Alabama	4	5	48	45	44	41	81	72	135	104	0	0	0	0
Arizona	23	18	12	10	14	15	172	156	131	106	37	24	38	25
Arkansas	2	2	2	2	6	6	11	10	30	26	3	3	8	6
California	71	52	253	216	254	218	339	298	225	180	41	28	94	77
Colorado	148	135	173	148	19	19	21	20	179	156	21	17	136	100
Connecticut	9	9	0	0	0	0	0	0	0	0	0	0	0	0
Delaware	24	19	86	65	64	52	12	10	114	69	18	11	14	9
District of Columbia	0	0	12	11	10	10	3	3	2	2	0	0	0	0
Florida	115	106	301	282	266	284	110	111	208	150	63	42	41	29
Georgia	11	9	6	5	48	49	85	84	146	114	49	37	23	18
Idaho	2	2	7	6	35	32	43	39	31	24	6	6	9	6
Illinois	34	30	140	181	52	50	62	54	73	56	14	10	13	10
Indiana	28	25	42	37	149	135	107	96	88	73	19	14	31	23
Iowa	11	9	62	56	160	158	218	181	264	195	126	83	59	37
Kansas	51	40	103	93	125	121	105	90	43	37	9	7	7	5
Kentucky	2	1	13	11	5	5	7	7	26	20	10	7	15	10
Louisiana	4	3	5	4	3	3	30	25	184	115	86	46	75	56
Maine	1	2	7	8	8	6	17	13	22	17	10	7	16	10
Maryland	89	68	24	23	18	19	93	60	74	46	5	3	33	17
Massachusetts	6	4	36	30	58	47	5	5	48	31	9	6	0	0
Michigan	16	15	134	108	32	31	17	17	27	24	4	3	3	2
Minnesota	19	16	41	36	48	40	70	63	220	147	56	33	49	31
Mississippi	1	1	62	53	93	86	17	16	59	38	21	14	43	30
Missouri	119	90	117	95	82	72	103	86	209	153	82	53	78	53
Montana	15	12	5	5	6	6	17	16	3	3	0	0	0	0
Nebraska	6	5	27	25	46	45	16	14	32	32	(3)	(2)	15	12
Nevada	8	7	4	4	1	1	0	0	0	0	0	0	0	0
New Hampshire	0	0	1	1	66	57	56	46	(16)	(1)	0	0	1	1
New Jersey	93	62	206	167	278	246	327	289	214	166	67	46	63	44
New Mexico	8	8	6	7	6	6	2	2	2	1	0	0	0	0
New York	274	206	699	546	1,016	817	774	576	840	538	115	69	150	100
North Carolina	67	66	38	32	101	108	70	34	67	51	2	1	11	8
North Dakota	13	9	16	12	52	47	42	36	76	51	6	4	13	8
Ohio	68	73	166	140	93	84	132	120	199	145	37	24	61	41
Oklahoma	27	23	66	58	57	53	62	54	28	18	4	3	8	5
Oregon	21	19	20	19	47	43	76	65	83	68	88	20	24	17
Pennsylvania	191	152	184	154	133	171	235	191	357	253	116	88	111	75
Rhode Island	2	2	0	0	1	1	0	0	0	0	0	0	0	0
South Carolina	4	4	0	7	6	7	11	10	10	10	1	1	1	1
South Dakota	24	22	40	34	69	69	62	51	94	72	29	20	31	21
Tennessee	40	36	68	58	30	35	49	43	83	66	11	8	11	8



[fol. 4674]

## Question 3 (Continued)

## (b) Aluminum Insulated Wire and Cable

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
Texas	328	292	412	376	459	443	356	331	393	307	81	99	86	62
Utah	10	10	25	22	58	53	49	47	48	38	11	8	6	4
Vermont	22	15	6	4	20	17	2	2	9	6	9	6	0	0
Virginia	42	32	46	36	149	118	109	88	168	107	64	42	38	16
Washington	34	30	77	69	167	160	231	204	244	190	26	19	68	47
West Virginia	2	3	9	9	11	11	7	7	22	16	0	0	0	0
Wisconsin	39	34	180	149	155	136	294	240	229	164	42	27	73	47
Wyoming	18	18	11	11	13	13	24	23	26	20	3	3	0	0
Canada, by: Aluminum Company of America	0	0	0	0	0	0	0	0	1	1	0	0	0	0

- Notes: (1) Total Aluminum Company of America sales to all companies for 1953 were 1,484,000# and \$1,303,000. No records of 1953 sales by states and Canada are available.
- (2) For 1954, records are slightly incomplete, and 103,000# and \$85,000 of the total sales cannot be identified by territory.
- (3) ( ) denotes credit. Credit figures result from cases where customers' returns and adjustments exceed shipments in a given territory and year.

[fol. 4675]

## Question 3 (Continued)

## (c) Aluminum Conduit

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
3(A) Total Sales to Other Companies, by:														
Aluminum Company of America	354	180	478	279	1,075	661	1,134	727	296	527	626	295	1,418	612
Alcoa International, Inc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	354	180	478	279	1,075	661	1,134	727	296	527	626	295	1,418	612
3(B) Sales to each State and to Canada:														
Alabama	0	0	6	4	17	11	1	1	7	4	1	1	6	3
Arkansas	0	0	0	0	2	1	4	2	23	12	5	3	2	1
California	0	0	18	10	13	8	31	19	53	27	15	8	26	12
Colorado	0	0	0	0	0	0	3	2	5	3	0	0	7	4
Connecticut	0	0	1	1	0	0	0	0	3	2	19	6	28	12
Florida	0	0	0	0	0	0	3	2	160	85	24	12	111	50
Georgia	0	0	0	0	111	70	33	24	51	26	49	25	100	47
Idaho	2	1	0	0	0	0	0	0	0	0	0	0	4	2
Illinois	18	13	118	67	272	167	309	208	97	47	42	20	125	52
Indiana	15	8	0	0	13	8	57	34	67	36	3	1	89	38
Iowa	0	0	0	0	0	0	0	0	2	1	23	12	14	6
Kansas	15	7	14	6	0	0	2	1	9	5	22	10	15	7
Kentucky	0	0	2	1	19	12	26	21	14	8	1	1	3	1
Louisiana	12	6	0	0	85	49	44	28	33	17	16	0	24	11
Maine	0	0	1	1	0	0	0	0	5	5	0	0	0	0
Maryland	1	1	4	2	0	0	0	0	0	0	0	0	3	1
Massachusetts	9	6	2	2	10	8	0	0	0	0	1	1	0	0
Michigan	0	0	1	1	4	3	11	7	21	11	3	2	55	24
Minnesota	5	3	1	1	0	0	3	3	13	6	5	2	18	8
Mississippi	1	1	0	0	0	0	3	3	0	0	0	0	0	0
Missouri	0	0	6	4	12	8	16	11	7	4	10	5	11	5
Montana	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Nebraska	0	0	7	4	0	0	0	0	12	6	1	1	3	1
Nevada	0	0	0	0	0	0	0	0	8	5	0	0	0	0
New Hampshire	0	0	0	0	3	3	4	3	8	4	0	0	0	0
New Jersey	26	13	13	7	49	27	27	16	28	14	75	32	60	24
New York	6	5	1	1	2	6	9	5	27	15	101	45	165	77
North Carolina	0	0	0	0	0	0	0	0	6	3	0	0	2	1
Ohio	17	8	73	39	111	65	152	90	82	44	9	5	70	30
Oklahoma	11	5	39	29	34	22	23	12	8	4	2	1	5	2
Oregon	0	0	0	0	0	0	0	0	12	7	4	2	0	0
Pennsylvania	34	18	53	31	116	72	82	56	80	43	77	36	245	106
South Carolina	0	0	0	0	0	0	0	0	20	11	1	1	7	3
Tennessee	37	18	0	0	1	1	23	17	17	9	10	5	0	0
Texas	7	4	1	1	40	25	54	33	31	16	22	11	17	8
Utah	0	0	0	0	6	4	1	1	1	1	0	0	3	1
Virginia	1	1	0	0	1	1	3	5	25	13	7	4	10	4
Washington	31	15	0	0	0	0	9	6	22	11	0	0	5	2
West Virginia	0	0	36	22	142	86	174	104	30	18	0	0	74	31
Wisconsin	4	2	7	5	4	3	3	2	4	2	73	33	0	0

Notes: (1) Total Aluminum Company of America sales to all companies for 1953 were \$34,000 and \$210,000. No records of 1953 sales by state and Canada are available.

(2) For 1954, records are slightly incomplete, and 102,000 and \$45,000 of the total sales cannot be identified by territory.

[fol. 4676]

Question 3 (Continued)

## (a) Cable Accessories for Aluminum Conductors

	1974		1975		1976		1977		1978		1st Quarter - 1979		2nd Quarter - 1979	
	Found (Thousands)	Dollars	Found (Thousands)	Dollars	Found (Thousands)	Dollars	Found (Thousands)	Dollars	Found (Thousands)	Dollars	Found (Thousands)	Dollars	Found (Thousands)	Dollars
3(A) Total Sales to Other Companies, by:														
Aluminum Company of America	1,468	3,706	2,899	3,774	3,029	4,507	3,078	4,532	2,290	3,672	305	816	365	921
Alcoa International, Inc.	0	0	0	0	0	0	118	222	13	37	5	7	0	0
Total	1,468	3,706	2,899	3,774	3,029	4,507	3,196	4,754	2,303	3,709	310	823	365	921
3(B) Sales to each State and to Canada														
Alabama	60	89	64	77	80	107	18	35	35	67	3	12	9	21
Arizona	2	11	15	20	20	36	28	45	30	31	4	7	11	12
Arkansas	18	53	68	87	4	12	19	26	13	17	5	7	3	7
California	47	119	142	165	263	303	121	214	147	254	34	53	41	93
Colorado	23	41	32	51	43	66	36	53	19	40	2	3	10	15
Connecticut	0	3	2	3	5	8	4	7	2	9	1	1	0	0
Delaware	1	6	10	12	3	4	5	6	3	3	3	3	1	1
District of Columbia	0	0	7	9	7	8	2	3	3	9	1	3	1	2
Florida	29	52	80	93	122	214	244	321	105	140	23	25	35	49
Georgia	40	87	85	93	96	128	62	91	65	94	20	24	21	24
Idaho	8	13	6	13	30	44	51	73	44	65	6	3	3	8
Illinois	61	132	67	133	133	212	125	230	50	110	27	32	10	19
Indiana	42	169	77	125	73	128	228	355	274	356	8	12	11	17
Iowa	18	36	38	51	45	126	29	39	38	57	2	2	16	12
Kansas	6	19	38	50	34	77	38	73	18	28	2	2	16	12
Kentucky	32	196	53	73	37	62	36	88	36	71	5	8	20	24
Louisiana	17	49	60	81	63	87	67	88	34	51	8	11	6	6
Maine	3	6	11	12	12	11	13	14	10	9	1	1	3	6
Maryland	9	23	36	43	24	30	9	15	31	49	4	9	20	23
Massachusetts	7	13	11	13	17	29	23	43	19	38	4	9	6	13
Michigan	52	124	163	255	180	251	102	146	111	150	38	51	18	25
Minnesota	53	103	95	134	98	212	71	122	53	90	11	18	16	17
Mississippi	47	61	75	77	78	83	55	65	77	90	12	17	20	23
Missouri	51	81	94	129	57	142	60	99	48	97	8	14	23	43
Montana	2	12	4	7	19	35	5	7	9	13	1	2	1	1
Nebraska	9	20	26	36	44	72	40	54	31	32	4	9	9	20
Nevada	2	4	3	5	1	3	1	1	1	2	0	0	1	1
New Hampshire	15	17	14	14	12	10	15	12	15	14	2	2	3	2
New Jersey	44	32	23	24	55	97	27	24	47	84	7	9	6	8
New Mexico	3	13	4	7	16	110	38	73	6	15	3	13	1	3
New York	49	63	70	88	97	118	142	273	154	268	27	78	27	90
North Carolina	9	30	33	43	43	59	42	69	49	70	10	11	12	19
North Dakota	7	12	40	43	18	32	11	23	14	20	11	15	10	13
Ohio	119	614	189	254	93	176	122	318	58	198	12	22	10	36
Oklahoma	24	61	56	55	56	59	66	67	56	73	16	25	13	14
Oregon	7	33	42	52	37	83	49	85	45	68	4	7	13	23
Pennsylvania	29	72	54	70	91	132	92	131	80	134	18	27	30	50
Rhode Island	0	2	2	2	3	5	6	11	3	7	1	2	1	2
South Carolina	50	55	26	30	39	43	28	32	19	25	14	13	4	4
South Dakota	5	110	76	137	11	47	25	34	23	37	6	13	5	8



[fol. 4677]

## Question 3 (Continued)

## (4) Cable Accessories for Aluminum Conductors

	1954		1955		1956		1957		1958		1st Quarter - 1959		2nd Quarter - 1959	
	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars	Pounds (Thousands)	Dollars
Tennessee	95	143	59	79	86	137	74	152	49	84	14	22	11	10
Texas	130	230	432	411	326	353	343	424	105	206	52	71	45	41
Utah	2	16	21	36	19	30	10	25	9	14	2	3	2	3
Vermont	3	4	6	5	8	8	4	7	7	10	1	1	2	12
Virginia	10	50	52	34	69	89	69	143	46	78	13	13	10	12
Washington	130	252	172	197	74	127	46	95	44	93	17	31	39	20
West Virginia	13	60	65	94	28	65	31	94	10	29	2	3	1	10
Wisconsin	14	54	35	60	52	85	45	73	43	81	9	23	7	10
Wyoming	2	4	3	6	25	51	9	23	4	6	0	0	0	0
Canada, by:														
Aluminum Company of America	0	0	2	7	1	5	1	2	2	5	0	0	0	0
Alcoa International, Inc.	0	0	0	0	0	0	1	1	1	1	0	0	0	0
Total	0	0	2	7	1	5	2	3	3	6	0	0	0	0

Notes: (1) Total Aluminum Company of America sales to all companies for 1953 were 1,932,000# and \$4,276,000. No records of 1953 sales by states and Canada are available.

(2) For 1954, records are slightly incomplete, and \$149,000 of the total sales cannot be identified by territory.

[fol. 4678]

## Questions 4 and 5.

List all products manufactured by Alcoa during the year 1954 (and 1958) showing, for each such product separately, the product code, unit of measure, quantity and value, as reported for the 1954 and 1958 Census of Manufactures, excluding those census code products manufactured by Alcoa which are not the same or similar to those manufactured by Rome and reported for the 1954 and 1958 Census of Manufactures

	Product Code	Unit of Measure	1954		1958	
			Quantity (Short Tons)	Dollars (Thousands)	Quantity (Short Tons)	Dollars (Thousands)
Aluminum Rod and Bar Rolled and Continuous Cast	33522-11-9	Short Tons	104,109(1)	65,165(1)	73,074(1)	58,422(1)
Bare Wire, Conductor	33922-11-1	Short Tons	241	162	137	137
Aluminum Cable Steel Reinforced (ACSR) and Other Bare Aluminum Cable	34892-61-1	Short Tons	35,561	26,594	28,418	23,883
Thermoplastic Covered	36312-35	(2)		63		
Polychloroprene (Neoprene) Covered	36312-37-5	(2)		88		488
Other (Include Thermoplastic Covered)	36312-39-1	(2)				980
Service Entrance Cable	36312-46-3	(2)		1,060(3)		3,033(4)
Unclassified	36312-98	(2)		728(5)		

Notes: (1) E.C. redraw rod is included in this code on Census of Manufactures report. However, a large part of the tonnage and value reported against this code is alloyed rod and bar, which is not manufactured by Rome.

(2) Census of Manufactures does not provide for reporting quantities on these items.

(3) Reported in error on Census of Manufactures report as Code 36312-46-3, service entrance cable. It is estimated that \$790,000 should have been reported as rubber insulated, Code 36312-44-7, and \$270,000 as thermoplastic insulated, Code 36312-45-0.

(4) Reported in error on Census of Manufactures report as Code 36312-46-3, service entrance cable. It is estimated that \$1,185,000 should have been reported as rubber insulated, Code 36312-44-7, and \$1,848,000 as thermoplastic insulated, Code 36312-45-0.

(5) Reported in error on Census of Manufactures report as Code 36312-98, unclassified. It is estimated that \$276,000 should have been reported as thermoplastic covered, Code 36312-35, and \$452,000 as polychloroprene (neoprene) covered, Code 36312-37-5.

(6) Shipments of aluminum conduit (Codes 36112-31 and 36112-32) were not reported separately on Census of Manufactures report due to insignificant tonnages involved.



[fol. 4679]

## Question 6

With respect to each of the following categories, give for each of the years 1948, 1950, 1952, 1954, 1956 and 1958 (a) the quantity and dollar value of (1) Alcoa's total sales and (11) such sales broken down as to shipments to each state and to Canada.

	(2) Open Wire (Covered for Distribution)						(3) Open Wire (Bare for Distribution) (4) Open Wire (Bare for Transmission)						(5) Service Drop Cable					
	1948		1950		1952		1948		1950		1952		1948		1950		1952	
	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars	Found's (Thousands)	Dollars
5(a)(1) Total Sales to Other Companies, by:																		
Aluminum Company of America	1,200	912	2,312	1,944	2,046	1,376	70,804	23,330	55,448	25,342	56,415	23,530	1,070	974	2,431	2,304	3,720	2,846
Alcoa International, Inc.	0	0	0	0	0	0	0	0	164	87	662	283	0	0	0	0	0	0
Total	1,200	912	2,312	1,944	2,046	1,376	70,804	23,330	55,612	25,429	57,077	23,813	1,070	974	2,431	2,304	3,720	2,846
5(a)(11) Sales to each State and to Canada:																		
Alabama	0	0	33	30	133	102	755	268	784	364	1,703	786	4	5	11	11	2	2
Arizona	7	5	0	0	49	38	449	170	289	133	787	308	16	13	8	9	82	66
Arkansas	0	0	0	0	0	0	793	323	107	52	65	26	2	2	2	2	30	26
California	54	37	108	84	74	46	2,901	1,075	6,834	2,834	6,056	2,235	17	15	146	134	151	134
Colorado	71	71	0	0	41	30	589	260	1,044	524	531	235	73	64	18	18	138	126
Connecticut	0	0	0	0	0	0	23	11	359	174	150	64	9	9	0	0	0	0
Delaware	0	0	13	11	1	1	345	130	79	34	85	36	24	19	51	41	113	63
District of Columbia	0	0	0	0	0	0	0	0	109	50	2	1	0	0	10	10	2	2
Florida	0	0	10	9	2	1	742	299	2,379	1,118	596	237	115	106	276	275	206	147
Georgia	6	5	34	35	75	57	411	165	955	447	899	377	5	4	14	14	71	55
Idaho	1	1	0	0	6	0	317	132	506	259	1,306	565	1	1	35	32	31	24
Illinois	0	0	33	31	18	12	2,093	636	1,575	751	1,403	627	34	30	19	19	55	44
Indiana	0	0	40	37	7	5	2,632	1,175	1,536	723	6,005	3,376	28	25	109	99	81	68
Iowa	4	3	60	49	51	54	301	120	1,595	772	965	404	7	6	120	109	183	141
Kansas	30	20	29	27	3	2	185	94	238	99	619	256	21	20	96	94	40	35
Kentucky	0	0	0	0	1	1	4,775	2,157	775	350	1,050	427	2	1	5	5	25	19
Louisiana	4	3	1	1	3	2	570	210	756	343	810	338	0	0	2	2	161	113
Maine	1	1	2	1	7	5	471	163	556	250	319	132	0	0	6	5	15	12
Maryland	89	68	10	10	35	23	395	153	647	302	1,520	552	0	0	8	9	39	25
Massachusetts	0	0	49	40	7	5	788	253	378	166	302	255	6	4	9	7	41	26
Michigan	7	6	7	6	0	0	1,646	634	2,063	1,232	1,430	575	9	9	25	25	27	24
Minnesota	0	0	25	17	164	103	1,643	639	803	367	754	340	13	12	23	23	56	44
Mississippi	0	0	3	2	44	26	407	172	691	302	933	373	1	1	90	84	15	12
Missouri	84	59	50	41	89	58	462	190	471	213	782	331	35	31	32	31	120	95
Montana	3	2	0	0	1	1	22	10	40	21	410	141	12	10	6	6	2	2
Nebraska	4	3	29	27	16	13	541	234	439	220	211	90	2	2	17	18	16	14
Nevada	3	2	1	1	0	0	199	87	5	3	22	9	5	5	0	0	5	7
New Hampshire	0	0	42	37	(21)	(0)	306	114	217	94	148	59	0	0	24	20	5	1
New Jersey	82	52	198	164	83	61	715	265	1,253	514	1,316	689	11	10	60	62	126	109
New Mexico	0	0	0	0	0	0	43	18	249	126	0	(2)	8	8	6	6	2	1
New York	247	133	771	616	573	352	1,009	363	2,870	1,197	4,040	1,568	27	23	245	201	267	136
North Carolina	6	4	8	7	3	3	1,420	501	1,046	433	1,549	626	61	62	93	101	64	48
North Dakota	7	7	32	28	53	33	810	240	69	34	149	65	6	5	20	19	23	16
Ohio	29	25	55	51	38	32	12,696	5,711	4,342	2,029	2,735	1,051	59	48	38	33	161	113
Oklahoma	9	7	20	17	9	6	1,222	568	849	417	925	391	18	16	37	36	19	12
Oregon	4	3	1	1	2	2	639	346	1,777	830	1,310	536	17	16	46	42	61	66
Pennsylvania	79	55	104	82	81	52	3,215	1,111	2,028	1,273	2,307	1,135	112	97	89	89	276	201

[fol. 4680]

## Question 6 (Continued)

	(2) Open Wire (Covered for Distribution)						(3) Open Wire (Bare for Distribution) (4) Open Wire (Bare for Transmission)						(5) Service Drop Cable					
	1954		1956		1958		1954		1956		1958		1954		1956		1958	
	Founds	Dollars	Founds	Dollars	Founds	Dollars	Founds	Dollars	Founds	Dollars	Founds	Dollars	Founds	Dollars	Founds	Dollars	Founds	Dollars
	(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)		(Thousands)	
Rhode Island	2	2	0	0	0	0	70	28	206	94	61	22	0	0	1	1	0	0
South Carolina	2	2	4	4	1	1	111	42	428	205	110	48	2	2	2	3	9	9
South Dakota	5	7	11	14	31	34	1,819	598	274	128	433	213	15	15	50	55	43	35
Tennessee	0	0	3	2	22	16	497	130	134	93	1,210	523	40	35	35	33	61	50
Texas	163	139	182	176	125	90	5,468	1,515	5,075	2,342	2,263	929	165	153	217	257	268	217
Utah	0	0	34	32	24	17	167	72	765	364	541	229	10	10	24	21	24	21
Vermont	22	15	13	10	6	4	226	94	201	91	595	225	0	0	7	7	3	2
Virginia	17	12	133	107	31	21	1,055	423	1,101	476	952	414	25	20	11	11	137	86
Washington	12	10	8	8	9	8	8,408	2,899	1,620	686	1,235	516	22	20	159	152	235	152
West Virginia	0	0	7	6	4	3	1,267	543	1,212	561	642	264	2	3	4	5	15	13
Wisconsin	30	25	131	110	82	51	920	385	1,100	551	1,750	725	9	9	24	26	147	113
Wyoming	0	0	0	0	2	1	199	85	141	72	63	30	18	12	13	13	24	15
Canada, by:																		
Aluminum Company of America	0	0	0	0	1	1	0	0	15	7	1	1	0	0	0	0	0	0

- Notes: (1) Item (1) serial cable, and Item (6) service entrance cable, are not produced, or sold, by Alcoa.  
 (2) Item (3) open wire (bare for distribution), and Item (4) open wire (bare for transmission) are combined into one category, since sales of bare conductor cannot be divided accurately between distribution and transmission. A large percentage of bare conductor can be used for either purpose, and our records do not show the use to which such conductor is put by the customer.  
 (3) Prior to 1954, no records of sales by state and Canada are available. Aluminum Company of America's total sales for 1948, 1950 and 1952 are as follows:

	1948		1950		1952	
	Founds	Dollars	Founds	Dollars	Founds	Dollars
	(Thousands)		(Thousands)		(Thousands)	
(2) Open wire (covered for distribution)	0	0	0	0	202	175
(3) Open wire (bare for distribution)	63,450	20,882	65,018	23,504	81,690	31,914
(4) Open wire (bare for transmission)					36	85
(5) Service drop cable	0	0	0	0		

- (4) For 1954, records are slightly incomplete, and 103,000 and \$77,000 of the total sales for open wire (covered for distribution), and 1,639,000 and \$1,506,000 of the total sales for open wire (bare for distribution and transmission) cannot be identified by territory.  
 (5) ( ) denotes credit resulting from cases where customers' returns and adjustments exceed shipments in a given territory and year.

[fol. 4681]

## Question 6 (continued)

With respect to each of the following categories, give for each of the years 1948, 1950, 1952, 1954, 1956 and 1958 \* \* \* (b) estimates of Alcoa's percentage of the total industry sales as determined or compiled by company, industry, associations, or other private or public studies or surveys:

- (1) Aerial Cable
- (2) Open Wire (covered for distribution)
- (3) Open Wire (bare for distribution)
- (4) Open Wire (bare for transmission)
- (5) Service Drop Cable
- (6) Service Entrance Cable

**Answer:** Other than for the year 1954, data are not available for total industry sales classified under the above categories. Further, Alcoa does not produce and has not produced either Aerial Cable (1) or Service Entrance Cable (6). Percentages given for 1954 are based on the Census of Manufactures data for dollar sales, adjusted to reflect those errors of Alcoa and Rome in reporting to Census that are shown in Alcoa's answer to Questions 4 and 5 of its questionnaire of August 19, 1959, and Rome's answer to Questions 8 and 9 of its questionnaire of August 18, 1959.

<u>Category Number</u>	<u>Category and Census Code Numbers Included</u>	<u>Alcoa's Percentage of Industry Sales for 1954 (dollar value)</u>
(2)	Open Wire (covered for distribution) Census Code Numbers 36312-31, 36312-35 and 36312-37	1.37
(3) & (4)	Open Wire (bare for distribution) and Open Wire (bare for transmission) Census Code Numbers 33923-11, 33923-51, 33923-71, 33922-11 and 34892-61	11.87
(5)	Service Drop Cable Census Code Numbers 33612-44 and 33612-45	2.21

[fol. 4682]

## Question 7

Specify the extent to which each of the products listed in response to 4 and 5 above are included in each of the categories listed above in 6.

Products Listed in Questions 4 and 5	Relationship to Question 6
Aluminum Rod and Bar, Rolled and Continuous Cast—Code 33522-11-9	Not included
Bare Wire, Conductor—Code 33922-11-1	Not included
Aluminum Cable, Steel Reinforced and Other	All Covered in Items (3) and (4)
Bare Aluminum Cable—Code 34892-61-1	All Covered in Item (2)
Thermoplastic Covered—Code 36312-35 (1954 Census only)	All Covered in Item (2)
Polychloroprene Covered—Code 36312-37-5	All Covered in Item (2)
Other (including Thermoplastic Covered) Code 36312-39-1 (1958 Census only)	All Covered in Item (2)
Thermoplastic Insulated—Code 36312-45-0 and Rubber—Code 36312-44-7 (Reported in error as Service Entrance Cable—Code 36312-46-3)	All Covered in Item (5)
Thermoplastic Covered—Code 36312-35 and Polychloroprene Covered—Code 36312-37-5 (Reported in error as Unclassified—Code 36312-98)	All Covered in Item (2)

[fol. 4683]

## Question 8

(a) List the machinery and equipment for the manufacture of rod which can be used interchangeably in the manufacture of aluminum E. C. Redraw Rod and copper rod.

Answer: Alcoa has no such machinery or equipment.

(b) To the extent that machinery or equipment for the manufacture of rod cannot be used interchangeably, please explain what steps would be necessary, including the economic factors involved.

- (1) to convert machinery or equipment for the making of aluminum E. C. Redraw Rod to machinery or equipment for the making of copper rod,
- (2) to convert machinery or equipment for the making of copper rod to machinery or equipment for the making of aluminum E. C. Redraw Rod and
- (3) to convert machinery or equipment to make both aluminum E. C. Redraw Rod and copper rod,

Answer: (b)(1) The following steps would be necessary to convert the continuous rod rolling mill at Massena to equipment for the making of copper rod:

Installation of four (4) preheat furnaces, including conveyors, and revisions of building to accommodate such furnaces



Installation of high pressure descaling and cooling sys-  
 [fol. 4684] tem, one (1) Dorr Thickener for recovery of  
 copper scale fines, pickling system for descaling coils,  
 water quench for cooling coils prior to pickling, and  
 pickling solution reclamation system  
 Cleaning of existing soluble oil system  
 Replacing zinc-lined tubes and coiling pans

The steps that would be necessary to convert the rod mill at Vancouver to equipment for the making of copper rod would be the same except that three (3) rather than four (4) preheat furnaces would be required, a new set of rolls would be required, and replacement of zinc-lined tubes and coiling pans would not be necessary.

With respect to both such mills, the cost of such conversion would be substantial and would result in lower production. The cost and results obtained would be so disparate as to be uneconomic.

(b)(2) Alcoa has no equipment or machinery for the making of copper rod.

(b)(3) To convert the continuous rod rolling mill at Massena and the rod mill at Vancouver so as to make both aluminum E. C. Redraw Rod and copper rod would require, in addition to the steps described in the answer to subdivision (b)(1) of this question, a revision of the soluble oil system in each mill so as to permit it to be sealed off from the copper coolant system, and additional coil storage space at Vancouver. Not only would the conversion be uneconomic for the reasons stated in the answer to subdivision (b)(1) of this question, but in addition interchangeability of these mills between copper and aluminum would be completely impractical due to the difficulty of cleaning up the rolling mill and coolant system. Any copper oxide scale contamination of the soluble oil coolant used for aluminum rolling would lead to the production of poor quality aluminum rod and in turn aluminum flake contamination of the water coolant used for copper rolling would lead to poor quality copper rods.

[fol. 4685]

#### Question 9

(a) List the machinery and equipment for the manufacture of wire and cable which can be used interchangeably

in the manufacture of aluminum wire and cable and the manufacture of copper and wire and cable.

Answer: The following stranding equipment:

- 20 tubular stranders
- 6 rigid frame stranders
- 5 planetary stranders
- 2 rewind and repair lines

The following insulating and cabling equipment:

- 1 rewind and repair line
- 1 electrical test tank
- 1 bunch strander
- 1 4½" plastic extruder
- 1 cable twister

(b) To the extent that machinery or equipment for the manufacture of wire or cable cannot be used interchangeably, please explain what steps would be necessary, including the economic factors involved,

(1) to convert machinery or equipment for the making of aluminum wire and cable to machinery or equipment for the making of copper wire and cable.

(2) to convert machinery or equipment for the making of copper wire and cable to machinery or equipment for the making of aluminum wire and cable, and

(3) to convert machinery or equipment to make both aluminum wire and cable and copper wire and cable.

[fol. 4686] Answer: (b)(1) The following steps would be necessary to convert wire-drawing equipment for the making of aluminum wire to equipment for the making of copper wire:

Revisions to 1 fine wire and 20 breakdown machines.

Replacement of 20 electric rod welders with welders having double capacity

Installation of 3 water-seal and 9 electric-bell annealing furnaces for bright copper anneal, including additional floor space for the furnaces

Clean-up machines and lubricant systems

Wire-drawing capacity, on a footage basis, would be lost since the speed of drawing copper on such equipment would be one-half that of drawing aluminum.

(b)(2) Alcoa has no machinery or equipment for the making of copper wire or cable except that which, as noted in the answer to subdivision (b)(1) of this question, may be used interchangeably in making aluminum and copper wire.

(b)(3) To convert wire-drawing equipment to make both aluminum wire and copper wire would require the steps described in the answer to subdivision (b)(1) of this question plus the supplying of separate lubricating systems and necessary valving at the wire-drawing machines, and there would be the same loss of wire-drawing capacity on a footage basis since the speed for copper would be only one-half of that for aluminum.

[fol. 4687]

#### Question 10

Describe the changes, if any, in Alcoa's or Rome's production facilities and marketing organization which have been made since March 31, 1959, and the changes which are contemplated.

Answer: The changes are described in the answer of Rome Cable Corporation to Question 17 in the list of questions submitted to that corporation under date of August 18, 1959.

[fol. 4688]

#### Question 11

List the names and addresses of customers common to both Rome and Alcoa in the sale of rod, wire or cable during each of the years 1957 and 1958, and the first three months of 1959, classifying the rod, wire and cable products sold to each such customer by Rome, Alcoa or both.

Answer: This information is correctly given in the answer of Rome Cable Corporation to Question 18 in the list of questions submitted to that corporation under date of August 18, 1959.

[fol. 4689]

#### Question 12

Submit copies of all contracts or agreements between Rome and Alcoa providing for the manufacture by Rome of insulated conductor for Alcoa on conductor furnished by Alcoa.

Answer: These are submitted with the answer of Rome Cable Corporation to Question 19 in the list of questions

submitted to that corporation under date of August 18, 1959.

[fol. 4690]

Question 13

(a) List the names of companies, other than Rome, which performed, during the period from January 1, 1953 to date, insulation work on aluminum conductor supplied by Alcoa, whether pursuant to contract or otherwise.

(b) For each such company, give the amount paid by Alcoa for such work during each of the years 1953 through 1958 and each quarterly period of 1959, and describe the arrangements under which such work was performed.

Answer: (a) and (b) The only such company was Rea Magnet Wire Company, Inc., which has performed such work pursuant to a letter agreement dated August 20, 1958, a copy of which is submitted herewith. Payments by Alcoa to Rea Magnet Wire Company, Inc. for such work were as follows:

1958 .....	\$ 2,994.19
First Quarter 1959 .....	16,170.86
Second Quarter 1959 .....	

[fol. 4690a]

Question 14

Please submit

(a) All market, industry and company surveys, studies or reports made or considered in anticipation of, or in connection with, the acquisition of Rome or any other manufacturer of rod, wire or cable.

(b) All correspondence, memoranda, surveys, studies, reports and recommendations received from or sent to Ebasco Services Incorporated in connection with the proposed acquisition of Rome by Alcoa.

(c) All market, industry and company surveys or reports concerning competition, actual or potential, between aluminum and copper wire and cable.

Answer: (a) There were no such surveys, studies or reports.

(b) Reference is made to the letter dated January 2, 1959 from R. L. Schlesinger, Ebasco Services, Inc., to R. V. Davies, submitted in answer to Question 1 of the Depart-



ment of Justice letter of February 2, 1959, and there is submitted herewith a copy of a letter dated November 7, 1958 from R. L. Schlesinger to Ralph V. Davies.

(c) There is submitted herewith a copy of a report prepared by Alcoa's Commercial Research Division, dated July 25, 1957, entitled "Magnet Wire."

[fol. 4690b]

#### Question 15

Question 6 of our letter of February 2, 1959, requested the names and locations of "all" companies from whom stock or assets were acquired within the last ten years by Alcoa and by Rome. Your response, however, gives only acquisitions by Alcoa "which relate to the business conducted by Rome." We would appreciate a list of all Alcoa acquisitions and mergers in the last ten years.

Answer: All Alcoa mergers or acquisitions in the last ten years of all or substantially all of the capital stock or assets are as follows:

All the capital stock of Columbia River Orchards, Inc., acquired in 1957. This company was engaged in the fruit-growing business at Wenatchee, Washington, in the vicinity of the company's Wenatchee Works.

All the capital stock of Rockdale, Sandow & Southern Railroad Company, acquired in 1951. This is a railroad company operating between Marjorie and Sandow, Texas, at the company's Rockdale Works.

Substantially all of the assets of Dillsboro and Sylva Electric Light Company, acquired in 1957. This company, which was capable of producing only 225 Kw and was in financial difficulty, was engaged in the distribution, as a public utility, of electric power in the vicinity of Dillsboro, North Carolina, near the company's Alcoa Works in Tennessee.

[fol. 4691] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 41

Internal Correspondence

January 18, 1960

From:

Leon E. Hickman,  
Pittsburgh Office.

To: —

Alcoa has this day purchased the assets of Rea Magnet Wire Company, Inc. The Rea Company has plants at Fort Wayne and Lafayette, Indiana. The company specializes in the manufacture of smaller sizes of magnet wire, a product used in coil windings, transformers, motors and other electrical and electronic equipment. It is hoped that Rea, in affiliation with Alcoa, will bring aluminum wire into a number of these markets.

I attach a copy of a statement made to the Rea Company concerning Alcoa's proposed policies in the operation of the company.

Leon E. Hickman.

LEH:lm

Distribution:

Officers: Pittsburgh General Office, Product Sales Managers, District Sales Managers, Branch Sales Managers, Works Managers, Public Relations Managers, Subsidiary Company Heads, Sales General.

[fol. 4692] Aluminum Company of America

1501 Alcoa Building  
Pittsburgh 19, Pa.

January 15, 1960.

Mr. Samuel A. Rea,  
Chairman of the Board,  
Rea Magnet Wire Company, Inc.,  
Fort Wayne, Indiana.

Dear Sam:

If the stockholders of Rea Magnet Wire Company, Inc., approve the sale of your company to Alcoa, the most challenging opportunity confronting us both is how to utilize your people to the best advantage. Plants and technology are only significant in the hands of the right people. When we were last together, we spent more time on this subject than any other. We in Alcoa have continued to give it a top priority in our thinking because, above all else, we want to maintain the high esprit de corps of the Rea organization and to open to every man and woman in your company improved opportunities under the new program. You are free to tell your people that our thinking is running along the following lines:

(1) *All manufacturing and selling activities of Rea Magnet Wire Company, Inc., now conducted in Fort Wayne and Lafayette, Indiana, will be continued in those locations.* We already operate aluminum fabricating plants in Lafayette and Richmond and in July, 1960 will open the finest aluminum smelter in the world at Warrick, Indiana. Our experience in Indiana has been outstanding and, with your plants combined with ours, Indiana becomes a major manufacturing center for Alcoa.

(2) *A new corporation, likewise to be known as Rea Magnet Wire Company, Inc., will be formed to take over the properties of the present Rea Company.* Its Board of Directors will consist of a small number of Rea and Alcoa officers selected with an eye to a functional coordination of activities. You and the other officers of Rea will be expected to manage the new company, as you have the old, with only such changes in titles and functions as you have recommended to us or as time and changing circumstances ulti-

mately indicate to be in our common interest.\* Likewise, the rest of your organization will be carried over intact into the new company.

[fol. 4693] (3) *Wages and benefits.* We agree with you that you should continue your present policies with respect to salaries and wage rates of hourly employees and that you should continue your existing employee benefit plans, including profit sharing. However, should the new company ever be required to negotiate with a union on such matters, the new company can make no commitment as to the continuation of these benefits under those conditions.

(4) *We expect the new company to assume leadership in the development and utilization of aluminum magnet wire.* While we have no intention of minimizing your operations in copper magnet wire, we do anticipate that your experience in the magnet wire field and our know-how in the properties of aluminum can be combined through aggressive research into leadership in the development and utilization of aluminum magnet wire in those applications where aluminum is equal or superior to copper.

(5) *Research.* Both Rea and Alcoa are research-minded. We expect the new company to continue its research activities, indeed to expand them, but also to make full use of the research staff and facilities of Alcoa by coordinating programs.

(6) *We expect the new company to continue the present sales organization and policies of Rea, subject only to such modifications as experience may show to be in the common interest.* It is hoped that the Alcoa and Rea selling organizations can support each other and coordinate activities to their mutual benefit.

(7) *Purchasing.* We anticipate that the purchasing activities of the new company, particularly in copper, will be handled through its own organization, but in coordination with Alcoa purchases in the same or related fields.

(8) *The new company will operate functionally as a Division of Alcoa.* It will have full responsibility for the manufacture and sale of the products presently manufactured by the Rea Company and such others as may be appropriate to its activities. As a Division of Alcoa, Rea will draw upon Alcoa for such help as Rea may desire and [fol. 4694] Alcoa may have available, whether it be in the



field of research, manufacturing or engineering know-how, selling experience, customer contacts, or staff services of any of the numerous kinds made available in Alcoa. It is our intention to give the new Rea organization autonomy and authority commensurate with its responsibilities and to depend upon the good judgment of the Rea organization to make full use of the strength available through affiliation with Alcoa.

(9) *Modifications in the light of experience.* I am sure you realize that, while we speak in complete candor and good faith, these policies must always be subject to modification or change as experience may dictate. A rigid commitment on any of these points would be no more in your interest than in ours. For example, tax considerations may ultimately make it advisable to liquidate the new company into Alcoa and thereafter operate it simply as one of the Divisions of the parent company. Some of your people are quite likely to find additional opportunities for advancement in the Alcoa organization. No decision can be reached now as to where it would be advisable to manufacture new products or supplement the production of existing items.

There is an element of faith in this, as in all worthwhile matters. If we did not share that faith, we would not have offered your company this affiliation with Alcoa, nor would your Board have recommended its acceptance to your stockholders. We are counting on your people, strengthened by the support that Alcoa can give them, to develop the magnet wire business of Rea, both in copper and aluminum, well beyond its present potential. We can go far together if we maintain a mutual confidence and a willingness to adapt our program to changing circumstances. Subject only to those inevitable contingencies, this letter expresses our full thinking to date.

And I may say that we welcome you and every man and woman in the Rea organization into the Alcoa family with genuine enthusiasm and a confidence that we shall do well in partnership.

With cordial regards, I am

Sincerely, Leon E. Hickman, Executive Vice President.

LEH:lhbm

[fol. 4695] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 42

Rea Magnet Wire Company, Inc.  
East Pontiac Street  
Fort Wayne, Indiana

January 19, 1960.

To Our Organization:

It is a pleasure to be able to inform you of another progressive step in the history of our company, which will benefit each of us and our customers in many ways. Rea Magnet Wire has become a subsidiary of Aluminum Company of America.

Alcoa plans to continue the fundamental policies of our management *and no major changes in personnel or operating procedures are anticipated*. We are convinced that the Alcoa management shares our basic attitude toward customers, the community, and company personnel. In short, we expect to operate in the future very much as we have in the past.

Alcoa is an integrated producer of aluminum and a fabricator of aluminum products. It has pioneered in the use of aluminum as an electrical conductor and has developed new aluminum products and processes for the electrical industry. Its principal electrical product in Aluminum Cable Steel Reinforced (ACSR) used in power transmission lines. Rome Cable Corporation, a subsidiary of Alcoa, produces copper rods and bar and insulated wires and cables. It sells primarily to utilities, the construction industry, large equipment manufacturers, mines and refineries. As you know, we sell principally to manufacturers of smaller electrical components such as coil windings, transformers, motors, meters and the like.

Alcoa maintains one of the country's foremost research organizations. With the help of their labs, we expect to intensify our efforts to develop new products and money saving machinery for our customers.

Enclosed is a copy of a letter from Mr. L. B. Hickman, Executive Vice President of Alcoa, which outlines the basic principles which we have agreed should guide our opera-

tions in cooperation with Alcoa. Additional letters from time to time will deal with other aspects of this new partnership. Meanwhile we can pitch in on our respective jobs with the assurance that our possibilities, both as a company and as individuals, have been much improved.

I would be happy to answer any questions you might have about this new development.

Sam Rea.

[fol. 4696] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 44

Question A

Rea's total volume of sales in 1958 and 1959

Answer

1958 .....	\$18,446,591
1959 .....	24,998,249

[fol. 4697]

Question B

List of products made by Rea and dollar volume of sales therefor in 1958 and 1959.

Answer

The products made by Rea in 1958 and 1959, together with the dollar volume of sales therefor, are as follows:

	1958	1959
1. Round magnet wire, film insulated .....	\$18,404,053	\$24,984,596
2. Hard bare wire .....	38,602	11,653
3. Aluminum alloy film coated wire supplied for developmental purposes as guide wire for Army missiles .....	3,936	—

[fol. 4698]

Question C

Total value of shipments including interplant transfers of magnet wire in 1954 and 1958 broken down into product categories as reported to Census of Manufactures and corresponding data for 1959.

**Answer**

1954—Magnet Wire, Code 3631221 .....	\$14,311,322
1958—Magnet Wire, Code 36312 20 3 .....	17,661,000
1959—	24,065,000

**Note:** The amount for 1954 should have read \$14,311,222. Erroneously included in the above figures were cotton wrapped enameled magnet wire, hard bare wire and missile guidance wire (defined in answer to Question A).

[fol. 4699]

**Question D**

Amount of aluminum compared to copper magnet wire products made and sold in 1954, 1958 and 1959.

**Answer**

	1954	1958	1959
Copper, pounds .....	22,366,683	26,568,524	32,619,352
Aluminum, pounds .....	none	929	6,592

**Note:** Aluminum magnet wire was produced and sold by Rea on a toll and agency arrangement with Alcoa.



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[fol. 4700] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 47.

Report to Stockholders of Rome Cable Corporation  
as of March 31, 1937

[fol. 4701]

**Rome Cable Corporation**  
**Rome, N. Y.**

**To the Stockholders:**

Your Company was incorporated on January 20, 1936 and started to do business about April 1, 1936. Actual manufacturing operations began, in our bare wire and weather-proof departments, approximately July 1, 1936 and all of the departments were under way by the end of 1936. The accompanying income account thus presents the results of our operations for a twelve-month period dating approximately from the time the Company commenced doing business.

There is presented herewith financial statements of your Company as of March 31, 1937 and a certificate of our auditors, Ernst & Ernst. As shown therein, net profit from manufacturing operations amounted to \$48,982.24 which, after absorbing pre-production expenses incurred prior to July 1, 1936 of \$47,366.00, leaves a balance of \$1,616.24 carried to earned surplus at March 31, 1937.

The quarterly operating results since July 1, 1936 to March 31, 1937 were as follows:

From July 1, 1936 to September 30, 1936.....	( Loss )	\$14,910.38
From October 1, 1936 to December 31, 1936.....	( Profit )	11,191.49
From January 1, 1937 to March 31, 1937.....	( Profit )	52,701.13
Total net operating profit for period.....		\$48,982.24

As stockholders were previously advised, in considering these figures it should be remembered that few departments were in complete operation during all of those periods and, further, that during this time the Company absorbed the burden and expense of beginning production and perfecting its organization.

In connection with the preparation of our financial statements, special consideration has been given to the basis of inventory valuation by reason of the wide fluctuations in basic commodity prices which have occurred during recent months. In order to avoid including unrealized inventory profits in our financial statements, the Company has adopted the conservative policy of inventory valuation which is fully described in the accompanying auditors' report.

We have made it a practice to immediately purchase all necessary raw materials to cover orders placed with us by customers. As of March 31st we had a small surplus of copper purchased over and above commitments to customers at an average price of less than the present market price.

Deliveries of certain items of equipment to complete various departments have been considerably delayed, but we anticipate our plant operations will approach the level projected some time during the April/June quarter.

We are comfortably booked with business for the next several weeks of operation and we are hopeful that the present price of copper will induce buying in the near future.

Recent remarks of several executives of large utility companies indicate that further expansion in their facilities cannot long be delayed, and it seems highly probable that the utilities and electrical manufacturers will place additional business in the near future unless further unwise legislation or unforeseen events seriously affect the rising tide of business generally.

We are keeping in step with the present trend of increasing rates of pay of all employees and while this has a natural tendency of increasing costs of production, yet this is being largely offset by the loyal co-operation of our entire organization in greater efficiency of operation.

May 3, 1937.

By Order of the Board of Directors.  
H. T. Dyett, *President.*

[fol. 4702]

## Rome Cable Corporation.

## Balance Sheet

March 31, 1937

## Assets

Current		
Cash.....	\$121,612.16	
Customers trade acceptances receivable.....	12,348.33	
Accounts receivable—trade (after allowance of \$763.51 for doubtful, etc.).....	264,250.82	
Inventories—Raw materials, supplies, in process and finished goods.....	562,893.14	\$ 961,104.45
Plant and Property		
Land, buildings (including \$91,559.82 on leased property), machinery, equipment, etc.—at cost.....	919,744.20	891,735.78
Less: Allowance for depreciation.....	28,008.42	
Deferred Charges		
Inventories of supplies.....	49,258.32	61,678.43
Unexpired insurance premiums, prepaid taxes, royalties, etc.....	12,420.11	
		<u>\$1,914,518.66</u>



## Balance Sheet—Continued

		Liabilities	
Current			
Accounts payable, etc.....		\$119,490.91	
Accrued wages, insurance, taxes, etc.....		20,828.31	\$ 140,317.22
Reserve			
For spoils, reels, and cases returnable.....			12,007.84
Capital and Surplus			
Common stock (of \$5.00 per value):			
189,250 shares limited of 200,000 shares authorized.....		946,250.00	
(10,760 unissued shares reserved for allotment by the Board of Directors to officers and employees of the Company at not less than \$10.00 per share):			
Surplus:			
Capital.....	\$814,327.36		
Earned.....	1,016.24		
		\$15,943.60	1,762,183.60
			<u>\$1,914,518.66</u>

Note: This balance sheet is subject to the comments contained in the accompanying certificate.

[fol. 4703]

## Rome Cable Corporation

## Income and Surplus Accounts

For the period from organization of the Company in 1936 to March 31, 1937\*

Income	
Gross Profit on Sales.....	\$168,734.46
Selling, Administrative, and General Expenses.....	119,489.08
Net Income From Operations (After providing \$28,008.42 for depreciation of buildings, machinery, equipment, etc.)... Other deductions (\$520.00), less other income.....	40,245.41 283.17
Net Profit From Operations.....	48,982.24
Deduct: Pre-production expenses incurred prior to July 1, 1936 (approximately as of which date certain manufacturing operations commenced).....	47,366.00
Net to Earned Surplus.....	\$ 1,016.24
Surplus	
Earned	
Net from income account, as above.....	\$ 1,016.24
Capital	
Excess of sales prices of 189,250 shares of common stock over par value thereof.....	\$903,376.00
Deduct: Commissions paid on sales of common stock.....	\$77,072.00
Expenses incident to incorporation, registration and sale of common stock, etc.....	11,976.64
Capital Surplus—Balance March 31, 1937.....	814,327.36
Total Surplus March 31, 1937.....	\$815,943.60

\* The Company was organized on January 20, 1936, but did not commence business until about April 1, 1936. Manufacturing operations were commenced in certain departments about July 1, 1936.

**Rome Cable Corporation,  
Rome, N. Y.**

We have made an examination of the balance sheet of Rome Cable Corporation, Rome, N. Y., as at March 31, 1937, and of the statement of income and surplus for the period from organization of the Company in 1936 to March 31, 1937. In connection therewith we examined or tested accounting records of the Company and other supporting evidence, and obtained information and explanations from officers and employees of the Company; we also made a general review of the accounting methods and of the operating and income accounts for the year, but we did not make a detailed audit of the transactions.

The inventories, which were taken and certified to us by the management, were test checked as to the accuracy of the computations and reviewed as to the method of pricing. Values used represent the lower of cost or market at March 31, 1937. In respect to basic materials cost is determined on the principle of "last-in first-out", i.e., by charging during each month the cost of purchases of basic material received and taken into inventories against the equivalent amount of such material contained in finished product shipped to customers during that month. The excess quantity, if any, of such shipments over receipts is charged with its pro-rata share of the book value of remaining receipts most recently added to inventories. The excess quantity, if any, of receipts over shipments is added to inventories at cost of such purchases.

At March 31, 1937, the Company had purchase commitments for additional plant equipment and for the major raw material requirements of its sales orders at prices not in excess of those prevailing at that date.

In our opinion, based upon the foregoing, the accompanying balance sheet and related statements of income and surplus fairly present the financial position of Rome Cable Corporation as at March 31, 1937, and the results of its our opinion that the statements have been prepared in accordance with accepted accounting principles.

**Ernst & Ernst.**

**New York, April 30, 1937.**

[fols. 4704-4705]

**Officers**

**H. T. DYETT** .....President  
**H. W. BARNARD** .....Vice-President and Treasurer  
**C. A. SCOTT** .....Vice-President and Sales Manager  
**V. W. COLLINS** .....Comptroller and Assistant Treasurer  
**A. D. R. FRASER** .....Secretary  
**C. H. ELLIS** .....Works Manager

**Directors**

**H. W. BARNARD**, Rome, N. Y. **J. H. DYETT**, Rome, N. Y.  
**V. W. COLLINS**, Rome, N. Y. **A. D. R. FRASER**, Rome, N. Y.  
**H. T. DYETT**, Rome, N. Y. **P. LINZ**, New York, N. Y.  
**C. A. SCOTT**, Rome, N. Y.

**Counsel**

**Messrs. Ferris, Burgess, Hughes & Dorrance**  
 Utica, N. Y.

**Auditors**

**Messrs. Ernst & Ernst**  
 New York, N. Y.



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[fols. 4706-4709] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 48

**Alcoa Annual Report 1959**

**[fols. 4710-4712] To the Shareholders of ALCOA**

Alcoa's sales and earnings turned upward in 1959, keeping pace with the general recovery from the 1958 recession.

During the first half of the year, Alcoa's volume of aluminum shipments increased rapidly and reached the proportions of a peacetime record for the month of July. In August and September, however, incoming orders and shipping releases dropped abruptly, partially because of high inventories accumulated by customers in anticipation of a strike in the aluminum industry, and partially because the manufacture of many products using both aluminum and steel was necessarily curtailed when the steel strike occurred. The upward trend in business was not resumed until late in the fourth quarter.

Despite the wide fluctuation in demand during the year, the consumption of aluminum, as measured by the aluminum industry's shipments, evidenced an increase of 20 per cent over the previous record peak of 1956. At the year's end, customer inventories of aluminum apparently remained unusually high, a fact which still reflected the "strike buying" of the first and second quarters. The present outlook is for continued expansion of aluminum markets this year.

Foreign and domestic competition again was intense, adversely affecting prices and earnings. By December 17, 1959, however, your company was able to restore the price of primary aluminum pig to 26 cents. The increase of 1.3 cents per pound on that date, together with a 0.7 cents per pound increase on August 1, 1958, simply brought the price of aluminum back to its level of August 1, 1957.

During 1959, Alcoa carried on a broad, vigorous program to foster and take advantage of both new and growing markets. Research and development again resulted in new products, and in new and improved methods of production. Availability of increased smelting capacity was assured with resumption of construction at the Warrick smelter, near Evansville, Ind., which is expected to begin production by July, 1960. Sales, advertising and publicity efforts stimulated new uses for aluminum and gave increased impetus to existing applications. Foreign market opportunities for Alcoa were widened by agreements establishing affiliated

fabricating companies in Great Britain, Japan, Venezuela and Mexico.

In the domestic market, Alcoa took steps to provide more complete service to the electrical and architectural industries by acquiring three new subsidiaries. The principal objective of these new affiliations is to stimulate increased use of aluminum in the electrical and architectural fields.

The acquisition of Rome Cable Corporation, discussed in the Annual Report for 1958, was approved by Rome's shareholders. On March 31, 1959, the assets of Rome were transferred to Alcoa in exchange for 355,226 shares of common stock of Alcoa and the assumption by Alcoa of the obligations of Rome.

On January 19, 1960, 180,480 shares of Alcoa common stock were issued to Rea Magnet Wire Company, Inc., for the assets of that company and the assumption by Alcoa of the obligations of Rea. Rea manufactures copper magnet wire for use in electrical and electronic equipment, employing 770 people at two manufacturing plants in Fort Wayne and Lafayette, Ind.

January 23, 1960, 64,209 shares of Alcoa common stock were issued to the shareholders of Cupples Products Corporation in exchange for all outstanding shares of that company. Cupples fabricates, sells, erects and installs aluminum in architectural applications. It employs 880 people at plants in St. Louis, Mo.; Dallas, Tex.; and Dowagiac, Mich.

The directors and officers of Alcoa wish to express their sincere appreciation to the men and women of the company whose efforts have been responsible for the progress noted in 1959, and whose initiative and enterprise are so essential to Alcoa's future success.

I. W. Wilson, Chairman of the Board, Frank L. Magee, President.

1501 Alcoa Building, Pittsburgh 19, Pennsylvania, March 1, 1960.

**Annual Meeting:** The annual meeting of shareholders of Aluminum Company of America will be held on Thursday, April 21, 1960, at 10:00 a.m., E.S.T., in Ballroom Number One, The Pittsburgh Hilton Hotel, Pittsburgh, Pa.

. . . . .

**[fol. 4713] Electrical**

The electrical market for aluminum showed significant gains during 1959, with particular progress noted in aluminum bus bar and conductor for industrial buildings, conductor for utility service lines and utility substation structures. The use of aluminum conduit also increased as intensive sales efforts projected this product into a field long dominated by other materials.

With the acquisition of Rome Cable Corporation, Alcoa's position in the electrical wire and cable market was strengthened and diversified. Rome's bare and insulated conductor, [fols. 4714-4737] conduit, and cable supporting systems have been added to Alcoa's popular line of electrical products, thereby permitting the company to broaden its service to the electrical and other industries. Rome's facilities and techniques for the further commercial and technical development of insulated aluminum conductors should result in new and wider uses of aluminum in the utility, construction and missile industries. Distribution of these products is now handled primarily by Rome Cable Corporation, a wholly owned subsidiary of Alcoa.

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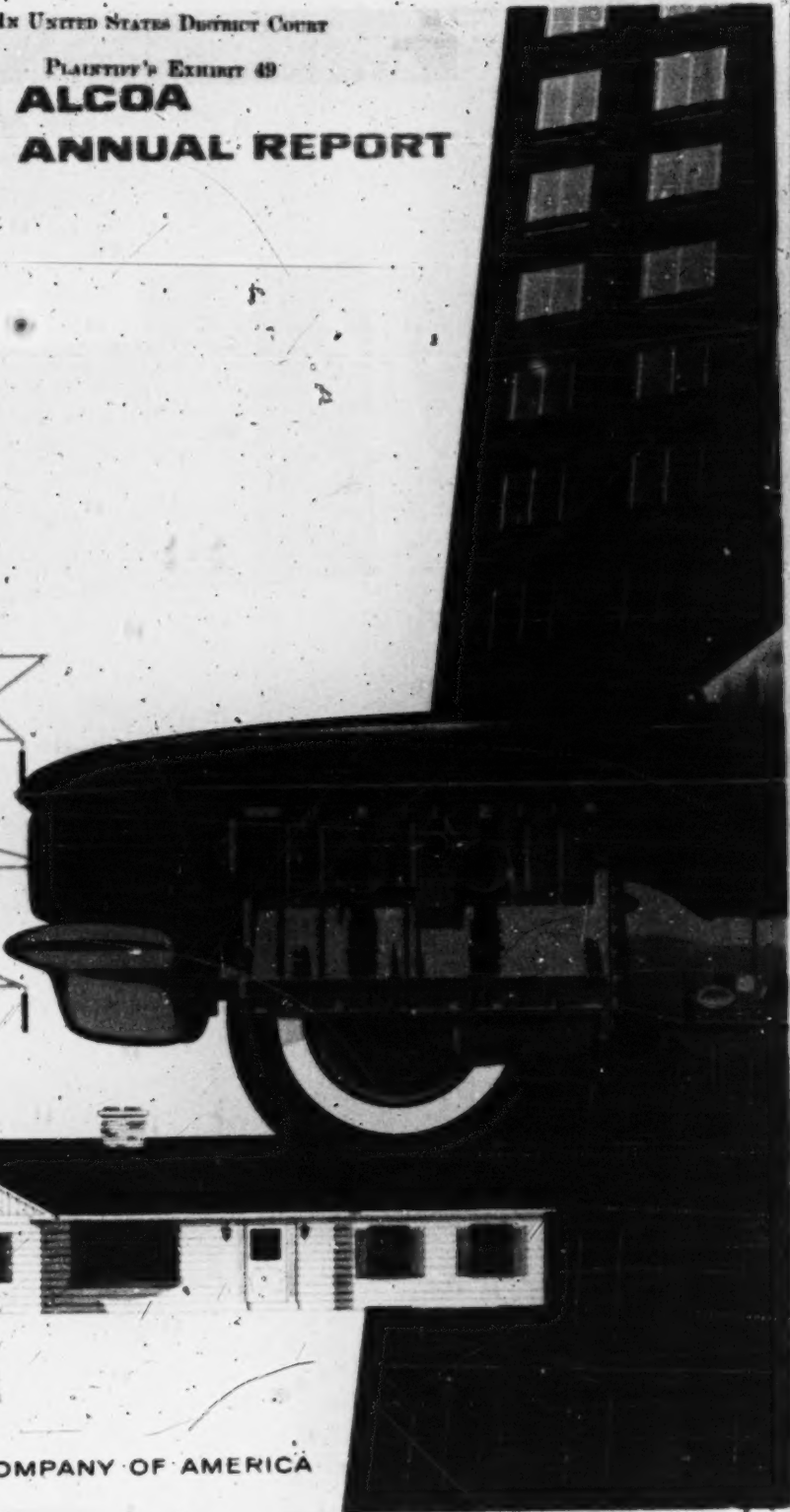
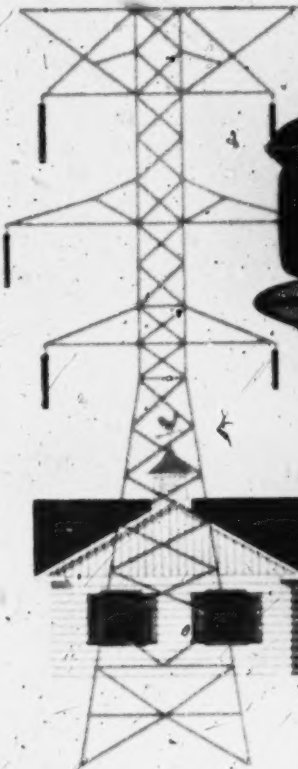
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(fol. 4738)

IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 49

# 1960 **ALCOA** ANNUAL REPORT



ALUMINUM COMPANY OF AMERICA



[fol. 4739]

**ALUMINUM COMPANY OF AMERICA****DIRECTORS AND OFFICERS**

(as of December 31, 1960)

**BOARD OF DIRECTORS**

M. M. ANDERSON

RALPH V. DAVIES

LEON E. HICKMAN

ALFRED M. HUNT

ROY A. HUNT

LAWRENCE LITCHFIELD, JR.

FRANK L. MAGEE

RICHARD K. MELLON

I. W. WILSON

GEORGE W. WYCKOFF

**HONORARY CHAIRMAN**

ARTHUR V. DAVIS

**OFFICERS**FRANK L. MAGEE, *Chairman of the Board*LAWRENCE LITCHFIELD, JR., *President*ROY A. HUNT, *Chairman of the Executive Committee*I. W. WILSON, *Chairman of the Finance Committee*M. M. ANDERSON, *Executive Vice President*H. C. FRISKINE, *Executive Vice President*LEON E. HICKMAN, *Executive Vice President*N. R. ALTHAUSER, *Vice President and Controller*THEODORE W. BOSSERT, *Vice President and Chairman of the Research and Development Committee*FREDERICK J. CLOSE, *Vice President and General Sales Manager*LEWIS P. FAVORITE, *Vice President in Charge of Product Sales and Commercial Research*R. J. FLETCHER, *Vice President in Charge of Engineering*ARTHUR P. HALL, *Vice President in Charge of Public Relations and Advertising*JOHN D. HARPER, *Vice President in Charge of Smelting and Fabricating*JOHN S. HARRISON, *Vice President in Charge of Personnel and Industrial Relations*L. O. KEEFER, *Vice President in Charge of Purchasing*ROBERT A. LEARNARD, *Vice President in Charge of Governmental Relations*ROBERT B. MCKEE, *Vice President in Charge of Sales*GEORGE W. STREEPY, *Vice President in Charge of Raw Materials and Refining*EDWARD B. WILBER, *Vice President in Charge of Finance*ALFRED M. HUNT, *Secretary*HATT W. STANLEY, *Treasurer*WILLIAM K. UNVERZAGT, *General Counsel***ASSISTANT OFFICERS**

J. E. COULTER

*Assistant Treasurer*

HARRY FLYNN

*Assistant General Counsel*

F. GUSTINA

*Assistant Controller*

T. THOMAS

*Assistant Secretary***PRESIDENTS OF PRINCIPAL SUBSIDIARIES**JOHN M. ARCHER, JR., *Norfolk Power and Light Company*ROBERT L. BECKER, JR., *East Aluminum, Inc.*A. BILLHARDT, *Alcoa Steamship Company, Inc.*A. D. ROSS FRASER, *Rome Cable Corporation*K. HEINEMAN, *Alcoa and Southern Railroad*LAWRENCE LITCHFIELD, JR., *Savannah Aluminum Company*JOHN M. MITCHELL, *Alcoa International, Inc.*CHARLES C. MORAN, *Copper Products Corporation*GEORGE W. STREEPY, *Alcoa Exploration Company*ROBERT L. WHEARLEY, *Rea Magnet Wire Company, Inc.*

[fol. 4740]

## ANNUAL REPORT 1960

*To the Shareholders of Alcoa*

Difficult market conditions throughout the metals industry during 1960 extended to aluminum and were reflected in the results of the year's operations for Alcoa. Gross revenues of the company were slightly higher than those recorded in 1959, but problems common to the aluminum industry generally caused earnings to be disappointingly low.

The most important single element contributing to the low earnings was the depressed price situation with respect to fabricated products. The general deterioration of prices throughout the industry resulted from many factors, including an excessive amount of unused aluminum fabricating capacity, and the continued importation of aluminum products to a market already amply supplied.

In addition to the unsatisfactory price levels, earnings were also unfavorably affected by the reduced pace of the nation's economy, accentuated in our industry because of the accumulation by consumers during 1959 of aluminum mill and end product inventories. This condition adversely affected the volume of shipments in 1960. Carrying charges on idle facilities, extending from refining through the smelting and fabricating operations, also contributed to the decline in earnings, as did higher-labor costs of recent years which were only partly offset by price increases.

On the other hand, aggressive new market promotions by Alcoa and the pattern of sales in certain areas of aluminum consumption justify a feeling of optimism and an expectancy of the return of business to more profitable levels. There is evidence that inventories in many lines have been considerably reduced. With any improvement in general economic conditions, there is every reason to expect that per capita consumption of aluminum will resume its growth in the United States and continue its upward movement in foreign markets. The current decade should be a period of great progress.

As a part of the company's continuing effort to reduce costs, studies are being made of the company's activities and the contribution that each makes to Alcoa's profit and development and, where indicated, vigorous steps are being taken to increase the operating efficiencies in all departments.

In the field of capital expenditures, prudent planning dictates that Alcoa must be prepared to meet the anticipated changing pattern of demand. At the same time, current conditions require that your management exercise great care in evaluating each proposed new expenditure, initiating only those which promise the most immediate gain.

At its December meeting, the Board of Directors adopted a comprehensive, company-wide program to insure that officers and employees would be free of conflicting interests when dealing with third parties on behalf of the company.

For all the directors and officers we extend sincere thanks to the men and women of Alcoa for their loyalty and devoted efforts in meeting the difficult problems of 1960.

FRANK L. MAGEE, *Chairman of the Board*  
LAWRENCE LITCHFIELD, JR., *President*

1501 Alcoa Building, Pittsburgh 19, Pennsylvania  
March 1, 1961

(left to right) FRANK L. MAGEE; LAWRENCE LITCHFIELD, JR.

[fol. 4741]

**FINANCIAL HIGHLIGHTS**

	1960	1959
Gross Revenues .....	\$869,780,176	\$864,967,722
Net Income .....	40,044,195	55,570,854
Per Share of Common Stock .....	1.76	2.52
Taxes .....	20,982,879	48,697,151
Per Share of Common Stock .....	.98	2.31
Dividends Declared		
Preferred Stock .....	2,474,688	2,474,688
Per Share .....	3.75	3.75
Common Stock .....	25,649,928	25,241,943
Per Share .....	1.20	1.20
Total Dividends .....	28,124,616	27,716,631
Earnings Reinvested in the Business .....	11,919,489	27,854,223
Capital Expenditures .....	80,341,301	54,660,992
Working Capital .....	303,849,551	319,298,650
Ratio of Current Assets to Current Liabilities .....	3.59 to 1	4.57 to 1
Common Stock Equity .....	693,219,271	667,040,079
Equity Per Share of Common Stock .....	2.52	31.71

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Public Relations and Advertising Highlights 9
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Facilities—fabricating 13
Foreign Activities 16
Organization Changes 16
Honors 17
Personnel and Industrial Relations 18
Financial Review 19
Alcoa Aluminum "From Mine to Market"
Operating Locations (Insert)
Wholly Owned Subsidiaries (Inside back cover)

**ANNUAL MEETING:** The annual meeting of the shareholders of Aluminum Company of America will be held on Thursday, April 20, 1961, at 10:00 a.m., E.S.T., in Ballrooms Number One, The Pittsburgh Hilton Hotel, Pittsburgh, Pa.

[Vol. 4743]

**MARKETS**

Although an excessive amount of unused fabricating capacity and keen competition kept prices and profits low, there were encouraging indications of progress in major markets, as described on the following pages.

The distribution of Alcoa aluminum products to industries was as follows: building and construction, 24%; transportation, 20%; electrical equipment, 10%; consumer durables, 13%; industrial machinery, 6%; containers and packaging, 8%; all others, including exports, 19%. These figures reflect estimated percentages for distributors and jobbers as well as shipments for further conversion.

**Building and Construction**

The building and construction industry was the largest single market for aluminum in 1960. A number of new architectural products were announced and projects were undertaken which are expected to increase Alcoa's participation in this market.

For residential applications, an eight-inch, clapboard-type siding introduced by Alcoa in 1959 was supplemented during 1960 with vertical siding and a new clapboard-type siding of four-inch width. All three products have proved popular with both builders

*These striking Colonnade Park Apartments in Newark, N. J., feature aluminum curtain walls fabricated and erected by Cupples Products Division of Alcoa.*



[fol. 4743]



*Alcoa Siding, available in three styles and ten colors, offers a high-quality building product which is ideal for refacing old homes as well as for new home construction.*

and homeowners. Alcoa Siding with foamed polystyrene and aluminum foil insulation complies with the standards set forth by the Federal Housing Administration for home improvement and new construction.

In a further effort to promote the use of aluminum as a building material in locations and projects which will command attention, Alcoa has joined with Webb & Knapp, Inc., in purchasing the 260-acre studio tract of Twentieth Century Fox Film Corporation in the heart of West Los Angeles and in developing a self-contained community of high-rise apartment houses and office buildings on this property. The project, to be known as Century City, offers an unprecedented opportunity to use aluminum in a wide variety of architectural applications.

A similar joint venture has been undertaken with the same company on an entire city block immediately

to the north of the United Nations' headquarters in New York City. It is planned to build on this property a high-rise aluminum and glass building which includes both office space and apartments of the luxury type. Here again, the modern architectural uses of aluminum will be dramatized in an effective setting.

Other Alcoa developments for the building and construction industry include the following products:

**Alcoa-Batten Roof**—A small aluminum roof with a combined leakproof anchoring and gutter system for use on structures with large roof areas. This product is especially adapted for use on commercial and industrial buildings.

**Alshade**—a new die-cast aluminum grille for architectural purposes which can be used for both solar shading and decorative effects. Typical uses are for refacing old buildings, providing a design element for new construction and screening gardens and patios.

### Transportation

One of the most important developments in the transportation market in 1960 was the extended use of aluminum in producing engine blocks for 1961 model automobiles. Aluminum engines are now standard equipment on four 1961 model compact cars and optional on four other compact and standard sized domestic models. The use of aluminum engine components, transmission housings and brake drums continues to give automobile manufacturers flexibility of

*Architect's model of Century City, a self-contained community of Los Angeles, Calif., which will be transportation's showcase for Alcoa aluminum architectural applications.*

*Automotive applications of aluminum continued to grow in 1960. This display features lightweight aluminum engine blocks, radiator grilles, transmission components and wheel assemblies.*





[Vol. 4745]

design—it also makes possible the reduction of dead weight plus improved performance and economy.

Aluminum trim applications showed a sharp increase in 1960 aided by Alcoa's development of a new anodizing process for automotive and appliance parts. The process yields a brilliant finish for aluminum trim and bumper alloys. Aluminum trim application will average 10.78 pounds per 1961-model car, the highest poundage for such applications to date and an increase of more than 25 per cent over 1960 models.

Aluminum evaporators and condensers for automobile air-conditioning units are now widely accepted, and an all-aluminum radiator is standard equipment on one popular U. S. produced sports car. Automotive engineers are evaluating aluminum bumpers for use on production model cars, and alloys developed by Alcoa are expected to hasten their acceptance.

Use of aluminum in the average 1960-model automobile was 54.4 pounds, an increase of 7 per cent over the average of 50.6 pounds in 1959 models. As in past years, aluminum was also widely used in trucks, trailers and buses in such forms as sheet and structural shapes for body construction; extruded sections for

flooring; forgings and castings for wheels and various fittings; and screw machine products for fastening.

In the aircraft, marine and railroad fields, aluminum also continued to find important applications. The expanding use of aluminum shipping containers and truck trailers in integrated freight service employing highway, rail and water movement, provides a significant extension to Alcoa's transportation market.

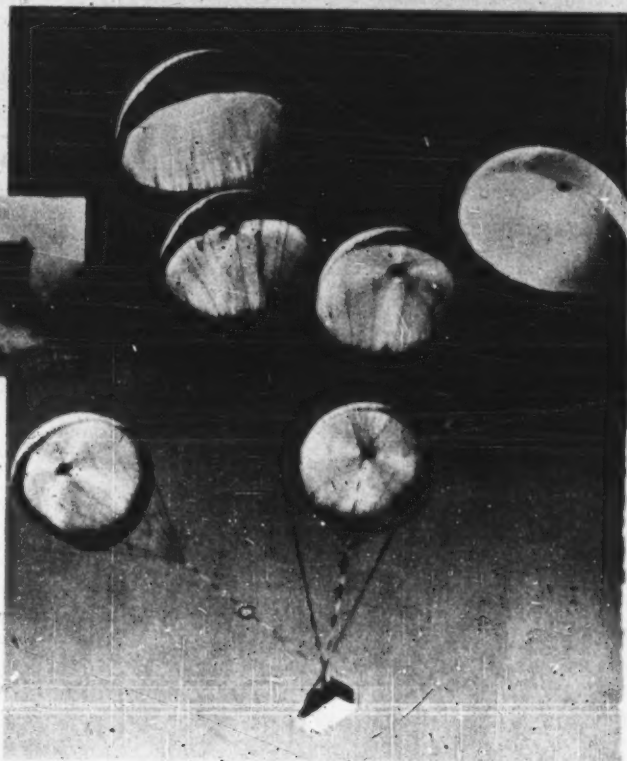
### Defense

In cooperation with various government agencies and their contractors, Alcoa entered into a variety of projects in the defense industry. One of these projects was the application of high-strength weldable aluminum sheet as a structural material in the *Saturn* interplanetary space vehicle. In other projects, high-strength aluminum components were used in such applications as rocket motor cases and liquid fuel tanks.

The light weight of aluminum proved especially valuable in the design of military equipment, including armored tanks and airborne equipment that is capable of being dropped by parachute.



The U. S. Army's new M-113 aluminum armored personnel carrier, which can be transported by air and dropped by parachute, and operated on land or in water.



[fol. 4746]

**Packaging and Containers**

The use of aluminum in packaging and containers became more widespread during 1960 because of its popularity with American housewives. While shipments of foil to converters leveled off somewhat because of heavy inventory buying in 1959, foil was widely employed in flexible wrapping materials, closures and special composite forms called laminates where it was combined with paper, plastics and other materials.

Because of the growing demand for foil bonded or laminated to paper, paperboard and other materials for packaging uses, Alcoa has installed added equipment to produce these materials. Used especially for overwraps and sealed packaging applications, the foil laminates offer both functional and decorative advantages where product freshness and content protection are essential.

Substantial gains were scored during the year in the field of aluminum rigid containers. Alcoa is working closely with can manufacturers who are developing and producing aluminum containers for a variety of products, including motor oil and food products such as citrus concentrates and fish.

A revolutionary experimental development in this field is an easy-opening end for a new can having a low-cost foil and paperboard body. The container is called Safe-Pack. A test marketing program was successfully carried out during the year and work has begun on the development of a pilot production line.

During 1960, foil was especially popular in the bakery and frozen food fields. Packers and consumers alike have recognized aluminum foil as a superior packaging material for product protection and convenience in preparing and serving food.

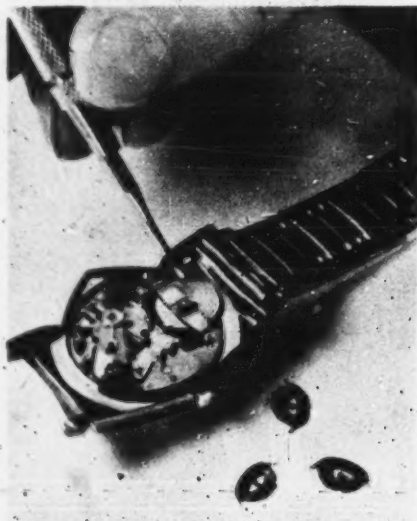
**Electrical**

An especially active field for aluminum in the electrical industry in 1960 was that of developing extra-high voltage (EHV) networks employing large diameter aluminum conductors. These conductors are suit-

*A coil of hair-thin magnet wire made by Resa Magnet Wire Division of Alcoa is essential to the precision performance of this new electric wrist watch.*



*Safe-Pack, a container development of 1960, has a foil-paper laminated body and aluminum ends with a quick-opening feature.*



[fol. 4747]

able for a power line with 10 times the load capacity of a typical 115,000-volt line. Power companies believe that the use of EHV will permit transmission of maximum flow over minimum rights-of-way.

Early in the year, Alcoa acquired Rea Magnet Wire Company, Inc., which, though operating independently, is now known as Rea Magnet Wire Division of Alcoa. This acquisition broadened Alcoa's service to the electrical industry and enabled the company to accelerate the use of aluminum sheet and foil strip conductors as well as aluminum magnet wire.

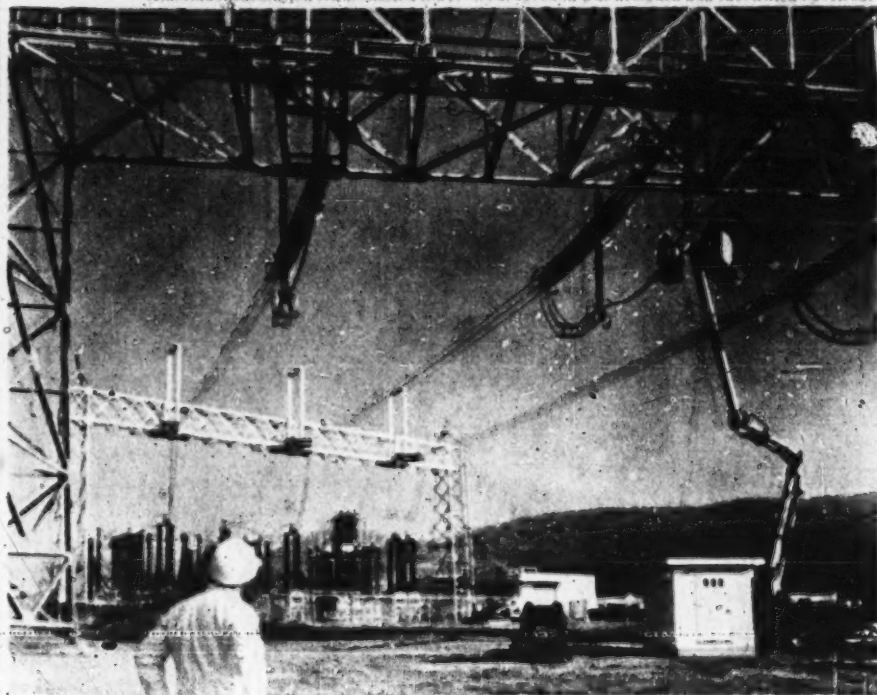
Rome Cable Division of Alcoa, which also operates as an independent subsidiary, now has a special products facility for the custom manufacture of cable products. Located in a new plant in Los Angeles, Calif., the new production unit is intended to serve the electronics market. Instrumentation cable supplied by the Rome Division is playing an important role in missile and rocket electrical systems, ground handling equipment and electronic data processing equipment in military and civilian applications.

### Structural

Developments in the use of aluminum for electrical transmission towers are encouraging. Towers in sizes which utilize up to 34,000 pounds each have been designed, fabricated and shipped by Alcoa to utility companies. Several power lines using aluminum towers were completed and energized during 1960, and towers for additional lines are under construction or have been ordered. Aluminum towers have passed rigid tests that proved they fully met service requirements, while offering economic in erection and maintenance costs.

Alcoa's efforts to achieve widespread acceptance of aluminum substation structures in the electrical industry have now been extended to include specialized buildings associated with the chemical and process industries. Aluminum offers outstanding advantages for these applications because of its resistance to chemical corrosion. Alcoa's structural division has special facilities at the company's Creston, Pa., works location to fabricate these and other structural assemblies.

*Experimental EHV (extra high voltage) power line using Alcoa aluminum conductors. Aluminum substation transmission tower in background was designed and fabricated by Alcoa.*



A noteworthy aspect of Alcoa's activities in 1944 was the company's continued effort to shorten the time between development of research findings and their profitable application. Through close cooperation between Research and other divisions of the company, working processes were improved and programs were initiated to stimulate new products.

Improved aluminum powders were developed for use as solid fuel propellants for the missile and rocket industry. New nonflashing aluminum pigments were produced that offer bright, attractive, durable colorings for automobile bodies. Methods were devised for preparing colored aluminum powder for use as a pigment in plastics, ink and paints.

Production lithographic printing on four-color and five-color presses to produce high-quality pictorial de-

signs, was accomplished for the first time on aluminum foil because of a special transparent coating developed by Alcoa Research Laboratories. This coating permits the foil surface of a foil-polyester laminate to be printed by the lithographic process with the same ease as ordinary coated papers.

During the second quarter the company inaugurated a packaging development laboratory at Murfreesboro, Tenn., as a division of the process development laboratories. The new laboratory will supplement the packaging development activities of Alcoa Research Laboratories and the sales development division. Work at the new location is directed toward expanding Alcoa's services to the packaging industry and increasing the use of aluminum flexible packaging, closures and rigid containers, including aluminum cans.

## PUBLIC RELATIONS AND ADVERTISING HIGHLIGHTS

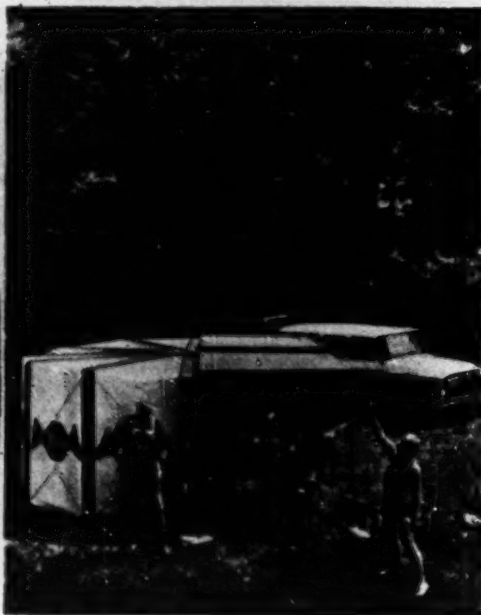
Through both advertising and publicity, the company sought to increase the demand for Alcoa products and to create an understanding of Alcoa by all segments of the public.

The public affairs program of Alcoa was broadened during the year. More than 2,300 salaried employees at plants and offices completed the Alcoa Course in Practical Politics designed to increase the individual

Alcoa's primary advertising is a compact campaign used in schools.



The expanded unit contains many sleeping quarters for six people.



employee's active participation in, and understanding of, our political system.

The company continued its aggressive advertising and promotional activities, with particular emphasis on automotive applications and on Alcoa'siding and related residential building products. Television, radio, newspapers, consumer magazines, trade and technical publications, direct-mail, motion pictures,

exhibits and store displays were used to stimulate demand for our own products and those of our major facturing customers. The increased use of aluminum in rockets, missiles, lightweight military vehicles, ground handling equipment for missiles and other defense materials prompted a new advertising program designed to capitalize on Alcoa's wide range of experience and facilities in this important market.

### FACILITIES

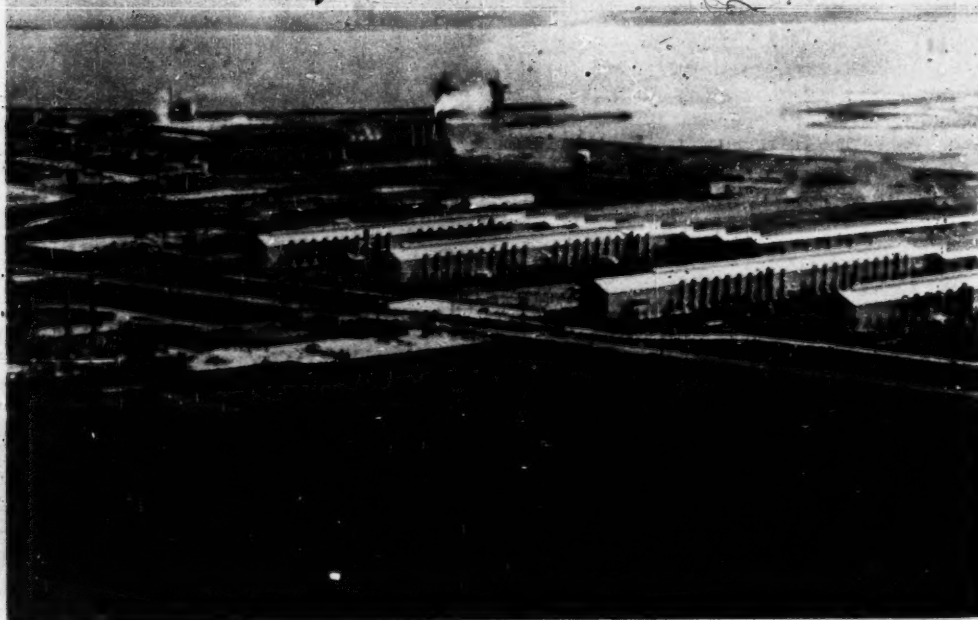
Alcoa's program of cost reduction and product improvement was intensified in 1960. One aspect of this program was the extensive application of computers and other electronic accounting equipment to improve the efficiency of the company's cost and budget control system. At all Alcoa operating locations, every effort was made to ensure that a high level of performance and product quality was maintained.

### New Materials and Refining

Production of bauxite in the Dominican Republic increased steadily through the efforts of Alcoa Exploration Company. The new refining works at Point Comfort, Tex., includes special equipment for processing Dominican type bauxite.

Alcoa's fourth major source of bauxite was acquired

*Aerial view of Alcoa's Point Comfort, Tex., operations, which involve both ore refining and smelting of aluminum. Electric power for this large plant is generated by radial engines burning natural gas.*



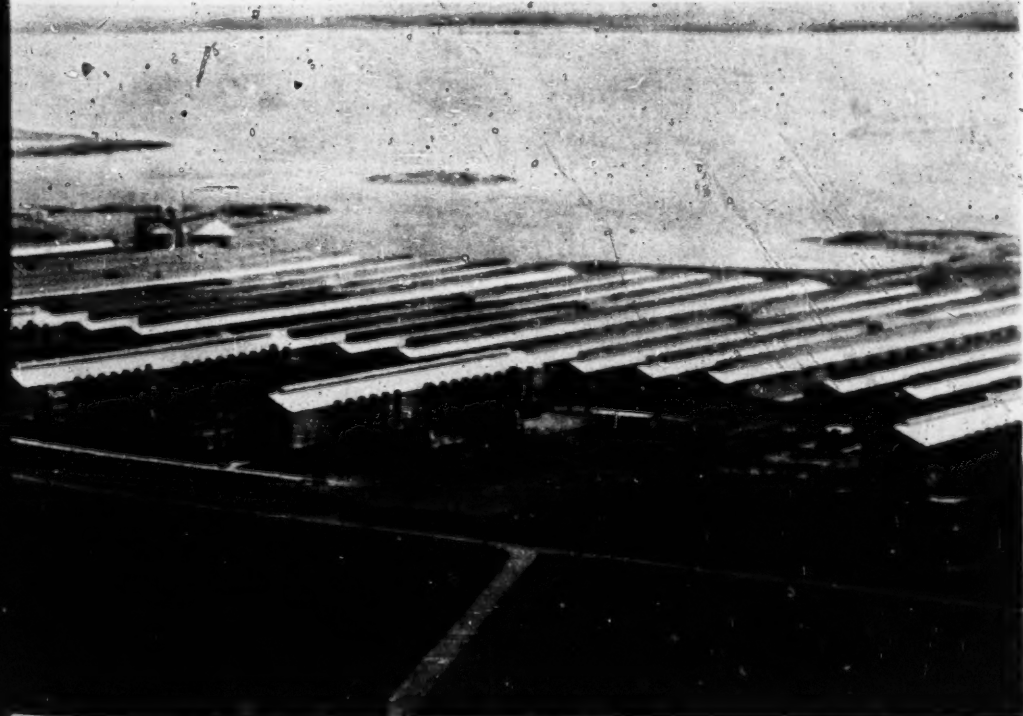
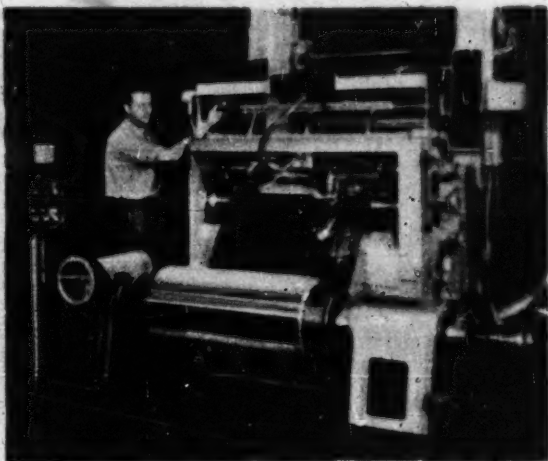


[fol. 4750]

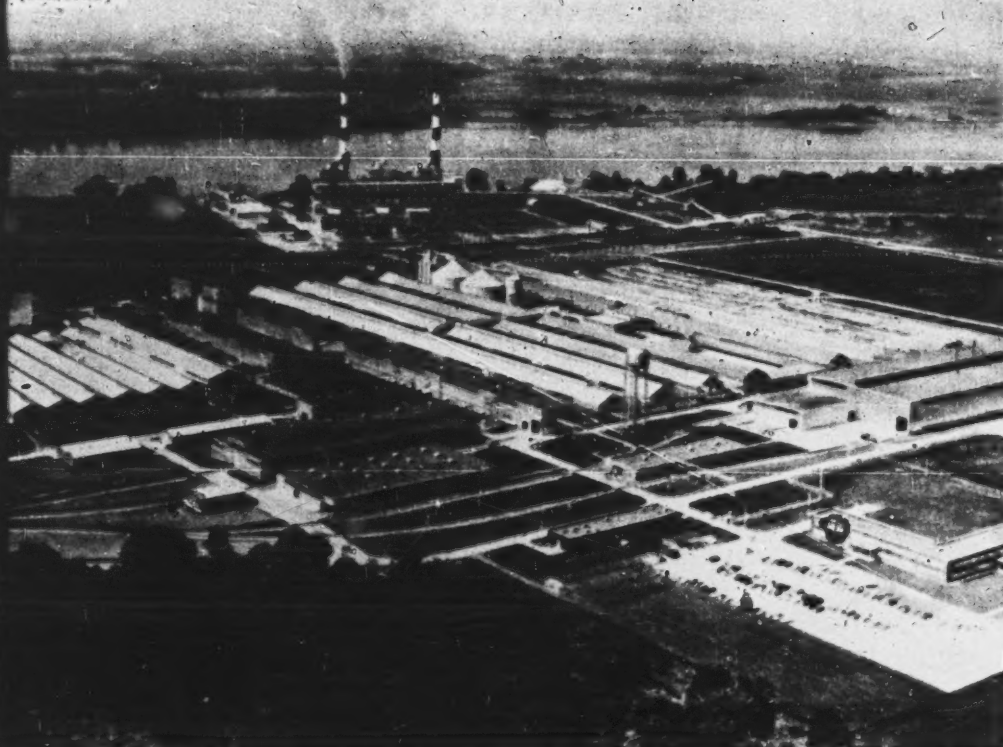
on May 50 when the company exercised an option covering mining rights on more than 30,000 acres of bauxite-bearing lands in Jamaica. These deposits will be developed during the next three years by Alcoa Minerals of Jamaica, Inc. Alcoa's other major sources of bauxite are at Bauxite, Ark., and in Suriname, where operations are conducted by Suriname Aluminum Company.

Remaining chemical operations at the East St. Louis, Ill., works have been scheduled to close early in 1962. New and more modern facilities at Bauxite, Ark., and Point Comfort, Tex., will replace the obsolete East St. Louis works for the production of aluminum fluoride, cryolite and alumina chemicals.

*Alcoa's foil mills are now equipped to splice the ends of foil rolls by ultrasonic welding. The process permits converter customers to operate foil processing equipment at high speeds.*



[Vol. 47:51]



*Aerial view of Alcoa's newest smelter, Warrick works, which began operations in June, 1960, near Evansville, Ind., using electricity produced in a coal-fired steam power plant.*

### Smelting

Production of primary aluminum by Alcoa totaled 72,000 tons in 1960 as compared with 67,000 tons in 1959. Although a number of idle potlines were restored to operation early in the year, one was closed in November and another was made inactive shortly after the end of the year.

The new Warrick, Ind., smelter began limited production in June. Completion of the plant will be de-

*Snugg fit of new interlocking design assures increased stability and ease of handling hot-balled aluminum ingots.*



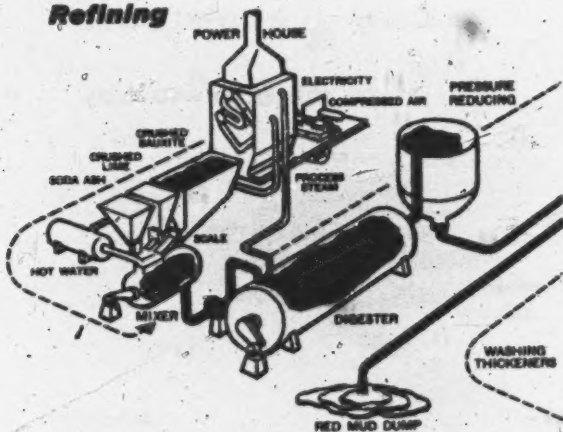
[fol. 4752]

**ALCOA ▲ ALUMINUM****from mine to market**

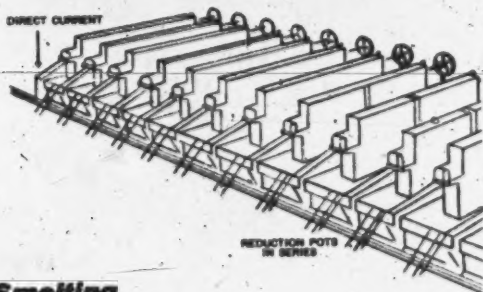
Bauxite, the ore most commonly used for the commercial production of aluminum, is found in large quantities in many parts of the world. Alcoa's major sources of bauxite are Suriname, the Dominican Republic, Jamaica (under development) and the State of Arkansas. Since bauxite usually occurs near the surface of the earth, it is mined with large power shovels. After being crushed and dried, it is shipped to refining plants for further processing.

**to Refining ...**

[fol. 4753]

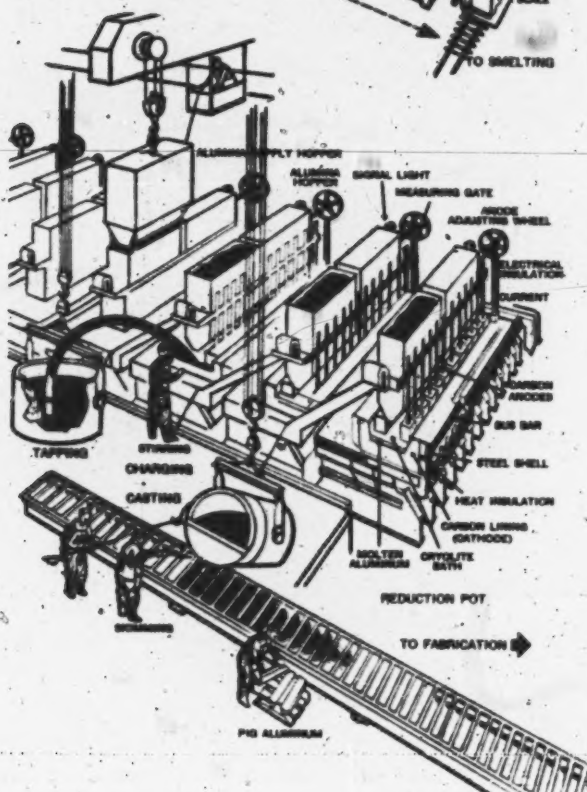
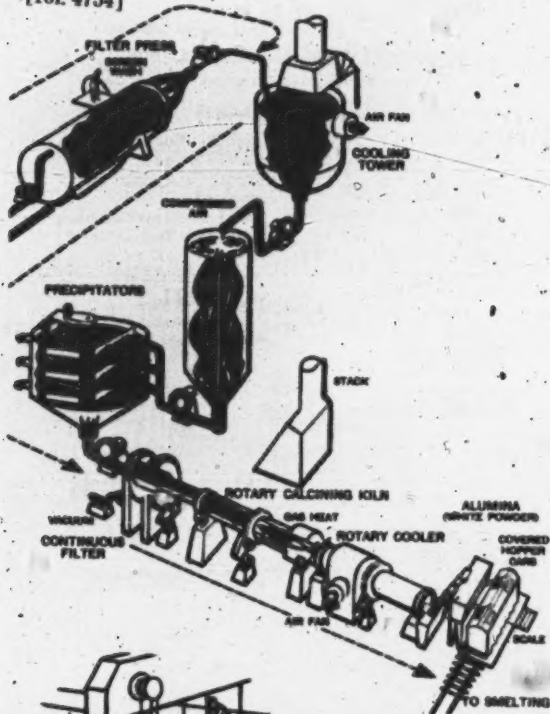
**Refining**

In the refining process, bauxite is mixed with a solution of caustic soda. When the mixture is heated under pressure, only the hydrated alumina (aluminum hydroxide) contained in the bauxite dissolves, while the solids and other impurities which remain are filtered out. The filtered solution is then cooled to produce a precipitate of hydrated alumina. This alumina, after being filtered from the solution and washed, is heated in revolving kilns to 1800°F. The resulting white powder—pure alumina—is then shipped to smelting plants, usually in railroad hopper cars.

**Smelting**

Metallic aluminum is produced by an electrolytic process that separates alumina into its component parts—oxygen and aluminum. In this process, pure alumina is dissolved in a bath of molten cryolite (sodium aluminum fluoride) in large electrolytic furnaces called reduction pots. By means of a carbon anode suspended in the bath, electric current is passed through the mixture, causing metallic aluminum to be deposited on the cathode, the carbon lining of the pot, where it settles to the bottom of the cell. The heat generated by the passage of electric current keeps the bath molten so that alumina can be added as necessary to make the process continuous. At intervals, aluminum is siphoned from the pots and the molten metal is transferred to holding furnaces for removal of impurities or alloying with other ingredients. It is then cast into ingots of various sizes for further fabrication.

[fol. 4754]







[fol. 4756]

## AFFILIATED OVERSEAS FABRICATING OPERATIONS

Alcoa, S.A. Mexico City, Mexico extrusions	Furukawa Aluminum Co., Ltd. Nikko, Japan sheet, extrusions
Alcoa Limited Aylesbury, England secondary aluminum	Oyama, Japan castings
Warwick, England aluminum castings	Imperial Fails Limited Buckley, England foil, foil castings
Langley, England extrusions	Imperial Aluminum Company Limited
Corporacion Venezolana de Aluminio C.A.-Coronal Maracaibo, Venezuela extrusions	Wentworth Works, Swansea, Wales sheet, extrusions
Tosco y Sotomayor, S.A. de C.V. Mexico City, Mexico drawn	

STYL, IND.  
extrusions, insulated copper  
wire

SEAS, S.A.  
castings

SEASIDE, IND.  
tanks and for  
drawn

SEASIDE, IND.  
castings (aluminum,  
mild, plastic  
pressed, light)

SEASIDE, IND.  
standard and custom  
drawn and framing,  
extrusions over

SEASIDE, IND.  
extruded  
copper and  
aluminum  
drawn wire

SEASIDE, S.  
casting aluminum

SEASIDE, S.  
castings (steel,  
permanently-mild,  
plastic pressed,  
forgings, light)

SEASIDE, S.  
cable lengths,  
cable pulling and  
insulation accessories

SEASIDE, S.  
cable, mild,  
fasteners, other  
machine products

SEASIDE, S.  
tube, extrusions, foil,  
drawn and pipe,  
casting aluminum,  
drawing products,  
light, fittings

SEASIDE, S.  
light

SEASIDE, S.  
extrusions, light  
extrusions, light,  
structural accessories

SEASIDE, S.  
light, wire, rod, bar,  
tube, cable accessories,  
structural shapes

SEASIDE, S.  
copper and aluminum  
electrical conductor  
wire and rod

SEASIDE, S.  
(to be closed)

SEASIDE, S.  
sheet, plate, foil,  
light extrusions

SEASIDE, S.  
(Edison works)  
die castings

SEASIDE, S.  
(to be closed)

2

OHIO

PA

N. Y.

N. J.

CONN.

N. C.

[fol. 4757]

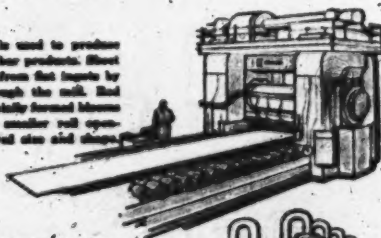
## ***Fabricating***

Aluminum has been called the world's most obliging metal, for it can be formed by every known metal-working process. The seven basic processes described here are simply the principal methods by which the majority of Alcoa's products are made. Alcoa uses many other fabricating processes.

Aluminum is readily joined by welding, brazing, riveting or soldering and is available in many different alloys suitable for a wide range of end uses. In addition, aluminum can be given an unusually wide variety of finishes. It can be painted, lacquered or colored permanently by an electrochemical process called anodizing. Because of its unique and valuable combination of advantages, aluminum has contributed greatly to man's progress and has become one of the most important metals of the 20th century.

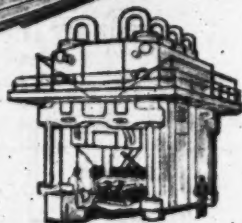
### ***rolling***

The rolling process is used to produce sheet, plate, rod and bar products. Sheet and plate are rolled from flat ingots by repeated passes through the mill. Rod and bar mills roll specially formed blooms through successively smaller roll openings to achieve desired size and shape.



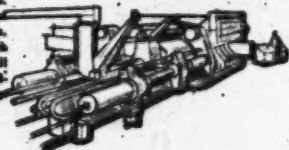
### ***forging***

Forged aluminum forging blanks are shaped either by forging hammers which pound the metal into prescribed shapes, or by forging presses which can pressure up to 50,000 tons.



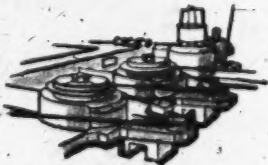
### ***extruding***

Because of its versatility, aluminum is easily adapted to the extrusion process. Under pressure from a mechanical or hydraulic ram, ingot is forced through a die opening, taking the shape of the die. In ingot extrusion, a cake-like slug of aluminum in a die is struck by a ram, causing the metal to flow back through the opening left between the die wall and the ram. The resulting hollow product assumes the shape of the opening.



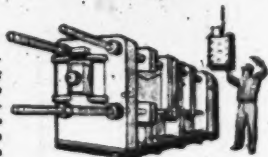
### ***wire drawing***

Because of its ductility, aluminum can readily be drawn into products ranging from bar to extremely fine wire. In this operation, aluminum stock is drawn through a series of metal dies which reduce the diameter and produce the desired shape.



### ***casting***

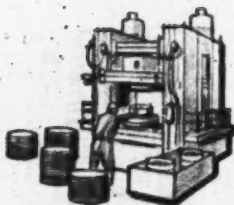
The casting process involves the solidification of molten metal in a mold having the shape of the finished product. In the sand, plaster and permanent-mold processes, aluminum is fed by gravity into the mold cavity. Aluminum die castings are made by forcing molten aluminum into a mold under pressure.



[fol. 4758]

*deep drawing*

Aluminum cooking utensils and many other types of containers are made by forcing a circular sheet of aluminum into a die under pressure from a hydraulic ram. Several preliminary draws may be made before the final shape and dimensions are achieved.

*machining*

One of the chief characteristics of aluminum and its alloys is the ease with which it can be machined. Castings, forgings, and many other products are regularly machined to their final shape and dimensions. This ease of workability makes possible high-speed production of serve machine products.



### Basic Characteristics of Aluminum

*Aluminum weighs only about one-third as much as copper or steel.*

*Aluminum is strong in alloy form.*

*Aluminum is highly resistant to corrosion.*

*Aluminum is an excellent conductor of electricity.*

*Aluminum transmits heat rapidly.*

*Aluminum reflects both light and radiant heat.*

*Aluminum can be safely used with foods and medicine.*

*Aluminum is nonmagnetic.*

*Aluminum can be given a wider variety of finishes than any other metal.*

*Aluminum does not readily absorb neutrons.*

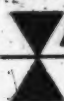
*Aluminum can be formed by all known metal-working processes.*

[fol. 4759]

To purchase Alcoa products, contact the Alcoa sales office nearest you for the name of a distributor or jobber who can best satisfy your requirements. Also check the Yellow Pages of your telephone directory under the word "Aluminum."

## ALCOA SALES OFFICES

AKRON 8, OHIO	505 Alcoa Savings & Loan Building
ALBANY 10, N. Y.	255 Lusk Street
ALLENTOWN, PA.	1152 Hamilton Street
ATLANTA 9, Ga.	Alcoa Building, 1615 Peachtree Street
BALTIMORE 2, Md.	1007 Commercial Credit Building
BIRMINGHAM 13, Ala.	P. O. Box 7424A
BIRMINGHAM 13, Ala.	1220 Vicks Avenue
BOSTON 16, Mass.	20 Providence Street, Park Square
BUFFALO (TUSAWANNA), N. Y.	Atlantic Street
CHARLOTTE 2, N. C.	1000 Wachovia Bank Building
CHATTANOOGA 2, Tenn.	1205 Volunteer Building
CHICAGO 11, Ill.	530 North Michigan Avenue
CINCINNATI 6, Ohio	Alcoa Building, 3531 Victory Parkway
CLEVELAND 13, Ohio	1450 Terminal Tower
COLUMBUS 15, Ohio	230 Bryson Building
DALLAS 1, Texas	1900 Fidelity Union Tower
DAVENPORT, Iowa	401 Brady Street
DAYTON 5, Ohio	307 Northtown Arcade
DENVER 6, Colo.	105 Fillmore Street
DIE MOORE 12, Iowa	3420 Ingersoll Avenue
Detroit 2, Mich.	610 New Center Building
FLINT 2, Mich.	310 West Foundation Building
FORT WAYNE, Ind.	2924 South Calhoun Street Building
GARDEN CITY, N. Y.	1001 Franklin Avenue
GRAND RAPIDS 2, Mich.	812 Michigan National Bank Building
HARTFORD 3, Conn.	1009 Asylum Avenue
HOUSTON 2, Texas	1310 Texas Eastern Building
INDIANAPOLIS 7, Ind.	2939 North Meridian Street
JACKSON, Mich.	510 National Bank Building
KANSAS CITY 3, Mo.	2300 Power & Light Building
LAFAYETTE, Ind.	P. O. Box 200
LIMA, Ohio	901 National Bank Building
LITTLE ROCK, Ark.	414 Calais Street
LOS ANGELES 17, Calif.	1145 Wilshire Boulevard
LOUISVILLE 2, Ky.	1152 South Building
LUBBOCK, Texas	205 Field Building
MEMPHIS 17, Tenn.	4515 Poplar Avenue
MIAMI (HIALEAH), Fla.	490 Hialeah Drive Building
MILWAUKEE 3, Wis.	2040 West Wisconsin Avenue
MINNEAPOLIS 34, Minn.	4010 West 65th Street
NASHVILLE 12, Tenn.	733 Wilson-Sutton Building
NEWARK 2, N. J.	744 Broad Street
NEW ORLEANS 12, La.	1225 Whitney Building
NEW YORK 17, N. Y.	250 Park Avenue
OAKLAND 8, Calif.	1001 46th Street
OKLAHOMA CITY 3, Okla.	111 N. W. 23rd Street
OMAHA 2, Neb.	746 Omaha National Bank Building
PEORIA, Ill.	414 Commercial Bank Building
PHILADELPHIA 2, Pa.	1800 Two Penn Center Plaza
PHOENIX 4, Ariz.	702 First National Bank Building
PITTSBURGH 20, Pa.	575 Greenway Road
PORTLAND 4, Ore.	1115 U. S. National Bank Building
PROVIDENCE 3, R. I.	2503 Industrial Bank Building
RICHMOND 30, Va.	908 North Thompson Street
ROCHESTER 18, N. Y.	Bank Building
St. Louis 8, Mo.	10th Floor, Continental Building
SAN DIEGO 3, Calif.	2042 Fifth Avenue
SAN FRANCISCO 4, Calif.	2309 South-McLure Building
SEATTLE 1, Wash.	1411 Fourth Avenue Building
SOUTH BEND 1, Ind.	805 13th S. Building
SPOKANE 1, Wash.	610 Fidelity Building
SPRINGFIELD 3, Mass.	306 Tinkell-Waters Building
SYRACUSE 1, N. Y.	731 James Street
TAMPA 9, Fla.	4002 Henderson Boulevard
TOLEDO 2, Ohio	350 W. Woodruff Avenue
WASHINGTON 6, D. C.	1200 Ring Building
WHITE PLAINS, N. Y.	100 South Broadway
WICKITA 2, Kan.	1010 Central Building
WILMINGTON 1, Del.	225 Bank of Delaware Building
WORCESTER 8, Mass.	22 Pleasant Street
YORK, Pa.	303 Manufacturers Building
YOUNGSTOWN 3, Ohio	337 Ohio Edison Building
ALCOA INTERNATIONAL, INC.	250 Park Avenue, New York 17, N. Y.
LIMA, PERU	Apartado 371
LONDON W. 1, ENGLAND	1 Portman Street



ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA  
GENERAL OFFICE, 100 ALCOA BUILDING  
PITTSBURGH 10, PENNSYLVANIA



[fol. 4760]

ferred until market demand warrants the additional production.

Work progressed as scheduled on the Tuckertown Dam near Alcoa's Badin, N. C., smelter. The new dam, which will provide the fourth Alcoa hydroelectric installation on the Yadkin River, is expected to be completed by May, 1962. The Tuckertown Development is part of a general program to modernize and expand the smelting facility.

A program involving the addition of furnaces and casting facilities for production of various types of commercial ingot at smelting locations was carried out during the year, and the term "pig" was abandoned as a designation for primary aluminum products.

A new interlocking design was developed for the popular 50-pound ingot. This new design has a superior surface appearance and offers increased shipping stability and ease of handling for banded ingot.

### Brokopondo Project

The Brokopondo hydroelectric and smelting plant development of Suriname Aluminum Company in Suriname progressed on schedule during 1960. The new 45-mile road from the head of navigation of the Suriname River at Paramaribo to the dam site at Alfobakka is open to traffic. The first bridge across the

Suriname River, located just below the future dam, was also completed.

Construction of the dam itself started in August. The construction camp was enlarged to house 1,200 personnel, and permanent staff housing was built at Paramaribo and the dam site. A testing laboratory, office, shops and other essential service facilities near the dam were also completed during the year. Base warehouses and storage tanks were erected at the smelter site but construction of the smelter itself will be timed to match the completion of the hydroelectric development.

### Fabricating

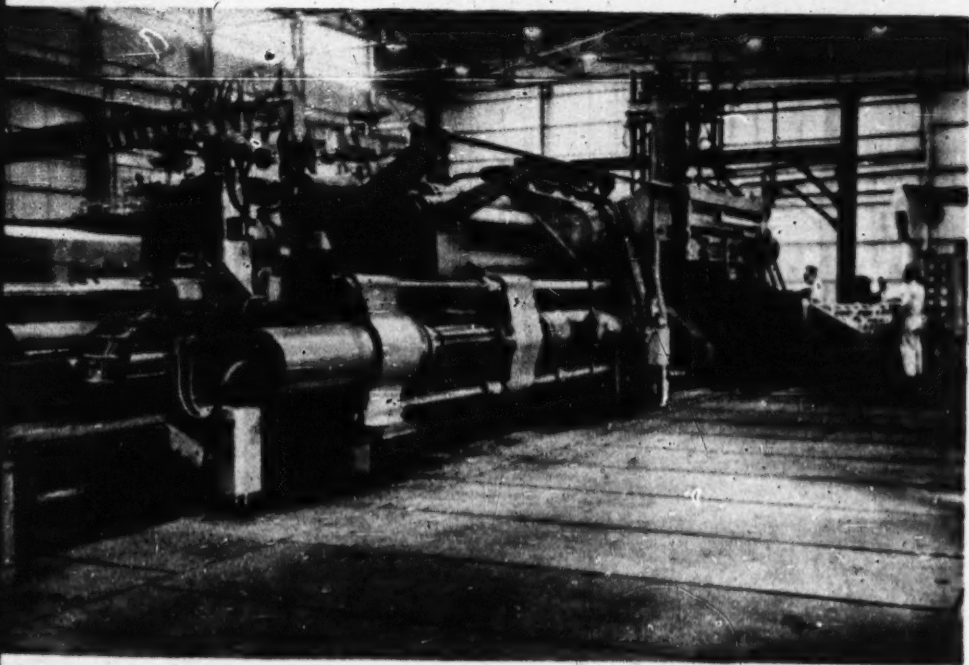
A continuing program of improvement and modernization in the fabricating plants resulted in several major changes in equipment, the decision to close two operating facilities and the start-up of one new facility.

The Bridgeport, Conn., foundry, primarily designed during World War II to produce a line of castings for the aircraft industry which are no longer needed in large quantities, will close by mid 1961. The balance of Bridgeport's casting business will be transferred to Alcoa's other foundries at Cleveland, Detroit and Los Angeles, and to the new Eshon works near Metuchen,

New equipment for producing enamel coated aluminum sheet, which Alcoa has installed at its Alcoa, Tenn., and Davenport, Iowa, operations.



[ol. 4761].



*New 5,000-ton extrusion press at Alcoa's Vernon, Calif., works. This press will fabricate large shapes for the architectural, aircraft and missile industries.*

N. J., which began operations in the fourth quarter.

The Edison works replaces the Garwood, N. J., works, a smaller die casting plant that has been operated by Alcoa since 1928. Edison works, now equipped with die casting equipment of the latest design, offers greatly improved working conditions and provides space for expansion that was not available at Garwood. The new facility is located within commuting distance of the Garwood works and has allowed the company to retain the highly skilled personnel employed at the old location. Edison works will also be producing permanent-mold castings by mid 1961.

To meet the rising demand for enamel-coated aluminum sheet, Alcoa began early in the year to increase its capacity to produce the new product. Construction was begun on two coating lines at the Davenport,

Iowa, sheet and plate mill during the first quarter and both lines were placed in operation by the end of the year. The lines are equipped to coat sheet continuously in widths up to 48 inches.

In mid year, the company began a two-year expansion and modernization of its two sheet mills at Davenport, Iowa, and Alcoa, Tenn., at a cost in excess of \$18 million. Both mills have been expanded and updated regularly, but the new 1960-62 program is designed to make them even more efficient producers. Many of the additions and improvements will be aimed at improving the company's ability to roll lighter gages of sheet in large volume at high speeds. Demand for this product line has remained at record levels and an increasing potential is seen for it in building products, appliances, packaging and automotive applications.

[fol. 4762]

At the Richmond, Ind., works, a third major expansion in less than three years will provide additional capacity for the production of closures. The popularity of screw-on caps for baby food jars has had a significant part in this growth. Existing facilities at Richmond will also be modernized as part of this expansion.

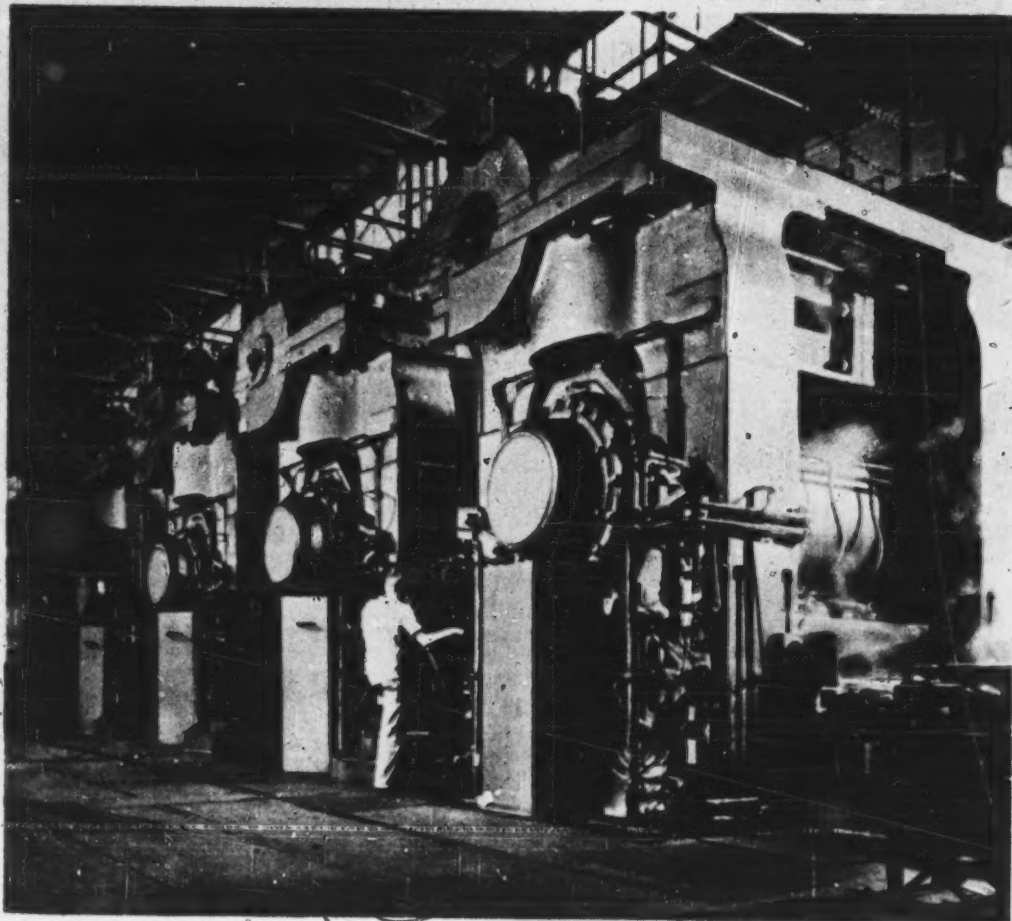
New equipment installations during the year included additional foil-paper and foil-wax laminators at Davenport, Iowa; a 44-inch, four stand tandem cold sheet mill at Alcoa, Tenn.; and a 5,200-ton extrusion press at Vernon, Calif., works. Installation of a new 4,000-ton extrusion press is under way at Cressona, Pa.

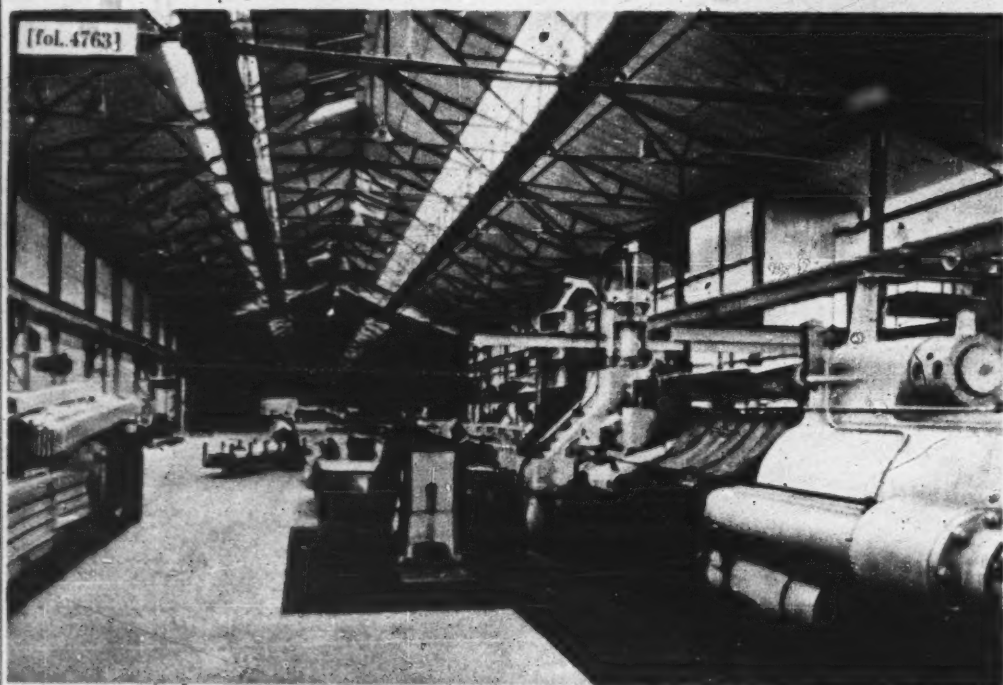
Alcoa has equipped all foil mills with ultrasonic welding equipment. The ultrasonic weld fastens the ends of foil strips automatically, permitting a continuous-coiling operation at considerable cost savings.

#### **Alcoa Steamship Company, Inc.**

In October, Alcoa Steamship Company, Inc., discontinued passenger service offered by the line's three passenger vessels because it was no longer economical. A limited passenger service will continue throughout the Caribbean area in freight ships and ore carriers.

*Huge rolling mills, such as this one at Alcoa, Tenn., are undergoing improvement and modernization as demand increases for new and varied sheet products.*





*Interior view of extrusion mill at Southern Forge Limited, one of the companies in England jointly acquired by Alcoa and Imperial Chemical Industries Limited during 1960.*

### FOREIGN ACTIVITIES

The company's foreign interests continued to grow during the year. Two acquisitions were made by Imperial Aluminium Company Limited, a British affiliate in which Alcoa owns a 39 per cent interest. Impalco, as that company is called, in February acquired Invicta Foil and Cheswright & Nicholls Foil Limited, a small foil manufacturing and converting company which has been renamed Impalco Foils Limited. On April 1, Impalco also purchased the aluminum rigid foil container facilities of The Prestige Group, a British affiliate of Ekco Products Company.

On May 4, Alcoa and Imperial Chemical Industries Limited, known as ICI, each acquired a 50 per cent share of a group of United Kingdom companies known

as the Associated Light Metal Industries, or Alumin Limited. The key company in the group is International Alloys Limited, the largest secondary smelter in the United Kingdom. The group also includes several aluminum fabricating concerns.

The company's Japanese affiliate, Furukawa Aluminum Co., Ltd., is continuing expansion of its operations, with the technical assistance of Alcoa, and is increasing its investment in other fabricating operations in Japan.

Sales of the company's products in overseas markets doubled during 1960 as compared to 1959. Vigorous programs are being formulated to define and achieve further penetration of these markets.

### ORGANIZATION CHANGES

Robert B. McKee, formerly vice president in charge of direct selling and distribution, was elected vice president in charge of sales on February 1, 1960. On this same date, Frederick J. Close, formerly vice president in charge of sales development and industry sales, was elected to the newly established post of vice president and general sales manager.

John S. Harrison, formerly general manager, personnel, was elected vice president in charge of personnel and industrial relations on April 21.

On September 15, 1960, three major changes were made in Alcoa's executive management. Frank I. Magee, Alcoa president since 1957, was elected chairman of the board and will continue as the company's

[ol. 4764]

chief executive officer. Lawrence Litchfield, Jr., executive vice president and member of the board of directors, was named president. I. W. Wilson, chairman of the board since 1957, was named chairman of the company's finance committee.

At a meeting of the board of directors held on December 15, the following management changes were made:

H. C. Erskine, formerly vice president in charge of production, was elected executive vice president.

John D. Harper, formerly assistant general production manager, was elected vice president in charge of smelting and fabricating.

George W. Streepey, formerly assistant general production manager, was elected vice president in charge of raw materials and refining.

Edward B. Wilber, formerly vice president and treasurer, resigned as treasurer and continues as vice president in charge of finance.

Matt W. Stanley, formerly assistant treasurer, was elected treasurer.

### Deceased

The directors and officers of Aluminum Company of America report with deep regret the deaths of two former directors.

Mr. George J. Stanley died on September 7, 1960. He had been a member of the board of directors since 1939. Mr. Stanley served as vice president of Alcoa from 1931 until his retirement from this post in 1949.

Mr. George C. Allen died on October 10, 1960. Mr. Allen was a member of the board of directors from 1926 to 1936.

### HONORS

Roy A. Hunt, chairman of the executive committee of Alcoa, received an honorary Doctor of Humane Letters degree from Grove City College on June 6, 1959. On April 5, 1960, Mr. Hunt received the Distinguished Alumni Award from Shady Side Academy in Pittsburgh, Pa. The Pennsylvania Society presented



(left to right) William K. Unverzagt, I. W. Wilson, Edward B. Wilber, Matt W. Stanley

(left to right) H. C. Erskine, George W. Streepey, John D. Harper, John S. Harrison



(left to right) Frederick J. Clow, Robert B. McKee





[fol. 4765]

Mr. Hunt its annual Gold Medal Award, for Distinguished Achievement on December 10, 1960.

John D. Harper, vice president in charge of smelting and fabricating, was cited with an award by the Austin, Tex., Headliners Club on January 30, 1960 for helping to bring industry to Central Texas.

*The Alcoa News*, Alcoa's employee magazine, received a Freedom's Foundation Award in February, 1960, for articles furthering "a better understanding of the American Way of Life" during 1959.

O. C. McCreery, assistant to the president, was given the Annual Alumni Award for Outstanding Achievement by the University of Minnesota on May 7, 1960.

Leon E. Hickman, executive vice president of Alcoa, received a Doctor of Laws Degree from West Virginia Wesleyan College on May 24, 1960.

Jay M. Sharp, manager of general advertising, was elected chairman of the Board of Directors of the Association of Industrial Advertisers in June, 1960.

In September, Alcoa was named among the 20 companies rated "Best Managed" by 171 corporation presidents in a panel sponsored by *Dun's Review and Modern Industry* magazine.

M. M. Anderson, executive vice president of Alcoa, was re-elected president of The Aluminum Association, principal trade organization of the industry.

## PERSONNEL AND INDUSTRIAL RELATIONS

Throughout 1960, the company continued its efforts to help its people make their fullest contribution to the enterprise and derive the maximum satisfaction from their positions.

### Management Development and Employee Education

Pittsburgh conferences of the Management Development Program were continued during 1960, bringing small groups of key management personnel together to review the company's problems and progress and to improve their individual effectiveness as managers for present and future responsibilities. Two hundred seventy management people have participated in this program in the past several years.

All levels of supervision have cooperated to improve employee understanding of the company's competitive problems and of the need to do the best possible job. Supervisory training programs for these objectives were conducted at plant locations. Courses in creative thinking were given at works locations and in the headquarters offices.

Approximately 300 trade apprentices were in training at 18 works locations during 1960. Graduated apprentices during the year numbered 75 and 12 previous graduates advanced to supervisory positions. An additional 700 men received technical training.

In order to seek out the best of 1960's college graduates, Alcoa's college recruiting staff with assistance from other company representatives visited 144 college campuses. From approximately 5,000 applicants who were interviewed and screened on campus and at company locations, 350 outstanding young men were selected for presently needed sales, technical and operat-

ing requirements and to provide a continuing source of future managers.

### Employee Benefits

The Employers' Group Insurance Plan provides sickness and accident benefits and hospital and surgical insurance for active employees of Alcoa and their dependents as well as life insurance for active and retired employees. Effective August 1, 1960, the plan was revised to provide hospital expense and surgical operation insurance to employees retired on pension under the Employees' Retirement Plan, and their wives.

The Voluntary Life Insurance Plan, for which the employees pay, and which became effective in 1949, provides additional amounts of life insurance and non-occupational accidental death and dismemberment insurance at favorable rates. The plan provides that life insurance in reduced amounts may be continued following retirement. As of December 31, 1960, approximately 35,000 employees were insured for nearly \$400,000,000 of life insurance.

### Industrial Relations

During 1960, additional wage and fringe benefit adjustments were made effective under the terms of the labor agreements negotiated in late 1959 and early 1960. These labor agreements expire on July 31, 1962. During the year there were no major strikes or work stoppages. Encouraging progress was made in the area of constructive employee and union relations with particular emphasis on assuring better understanding of the company's competitive situation and productivity requirements.

## FINANCIAL REVIEW OF 1960

## Net Income and Gross Revenues

Although net sales, operating revenues and other income, aggregating \$869,780,176 in 1960, exceeded the \$864,967,722 of gross revenues in 1959, net income decreased from \$55,570,854 to \$40,044,105. The 1960 amounts include operations of Rea Magnet Wire Company, Inc. and Cupples Products Corporation, which were acquired in January, 1960. Based on the number of shares of common stock outstanding at the end of each year, net income was \$1.76 per share in 1960 as against \$2.52 per share in 1959.

Income before taxes in 1960 was \$47,144,105, or 5.4 per cent of gross revenues as compared with \$90,570,854, which amounted to 10.5 per cent of gross revenues in 1959, indicating the effect of a continuing erosion of prices on fabricated and mill products that prevailed throughout the industry during 1960. Although Alcoa announced price increases effective August 1, 1960 on certain fabricated and mill products, the general price trend prevented the full realization of such increases, which, if obtainable, would have substantially mitigated the effect of contractual increases in labor costs that became effective on that date. An additional factor that adversely affected the amount of income before taxes was the payment of \$9,477,520 to a selling subsidiary of a Canadian corporation in return for the cancellation of a substantial portion of Alcoa's obligation to purchase primary aluminum under a purchase contract consummated in 1953. This contract is more fully described in Note D to the Consolidated Financial Statement appearing in the company's 1959 Annual Report. The company's remaining maximum obligation to acquire metal under such purchase contract amounted to approximately \$8,300,000 as of December 31, 1960.

Selling, general administrative and other expenses increased in 1960, partly as a result of the inclusion of the acquired subsidiaries, increased research and development and expanded sales activities.

The effective income tax rate in 1960 was substantially lower than the comparable rate in 1959, principally because of a substantial decline in the profits on domestic manufacturing operations, without a corresponding decline in profits on foreign mining and other operations that incur lower income tax rates. Other matters which affected the income tax rate were allowable percentage depletion, restoration to income of a reserve for molds and dies no longer required and

income which was subject only to a capital gains tax. Also, Alcoa elected to file a consolidated Federal Income Tax return for 1960 whereas separate tax returns were filed by the company and each of its consolidated subsidiaries for a number of previous years.

The amount of the reserve for future taxes on income applicable to 1960 has been restored to income. This reserve, which had been provided in prior years, applied to taxes that were deferred principally because the company elected to amortize the cost of assets covered by certificates of necessity for tax purposes at accelerated rates while depreciating the same cost for book purposes at normal rates.

## Dividends

Regular quarterly dividends on the Common Stock in a total amount of \$22,500,000 were paid during 1960, as follows:

Dividend No.	Record Date	Payment Date	Per Share
32	2/11/60	2/19/60	\$6.50
33	5/10/60	5/19/60	6.50
34	8/9/60	8/16/60	6.50
35	11/8/60	11/16/60	6.50

Preferred Stock dividends on the fully accumulated \$5,475,000 were also paid during 1960, as follows:

Dividend No.	Record Date	Payment Date	Per Share
32	2/10/60	2/1/60	\$6.875
33	5/10/60	4/1/60	6.875
34	8/12/60	7/1/60	6.875
35	9/16/60	10/1/60	6.875

[fol. 4767]

**Capital Expenditures**

A total of \$80,341,301 was invested in properties, plants and equipment during 1960. Major emphasis was placed on capital improvements directed toward reducing costs, improving quality, and acquiring facilities for the production of new products. Substantial sums were expended to continue the Brokopondo Project; complete the new die-casting plant at Edison, N. J.; finish the first potline at the Warrick, Ind., smelter; continue the hydroelectric project and smelter modernization at Tuckertown, N. C., and Badin, N. C., respectively; construct a new chemical plant at Bauxite, Ark.; and initiate the expansion of sheet-rolling facilities at Alcoa, Tenn., and Davenport, Iowa.

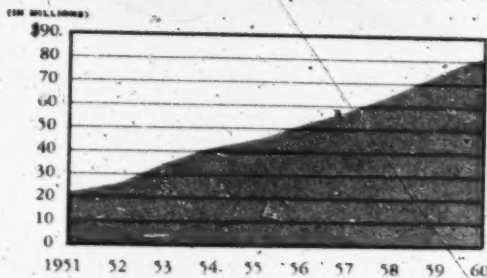
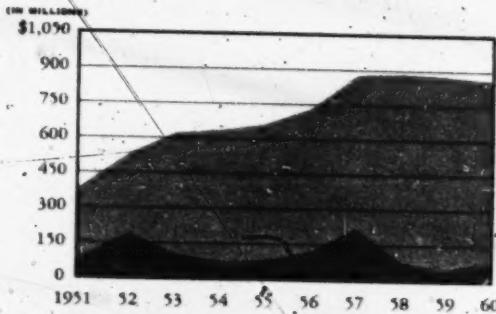
At December 31, 1960, unexpended balances of authorized projects amounted to \$171,491,000. It is estimated that approximately \$73,000,000 will be expended during 1961. Major items in the proposed program include development of the Jamaican bauxite ore deposits; construction of a fluoride plant at Point Comfort, Tex.; continuation of the expansion of sheet-

rolling facilities, and continuation of the Tuckertown and Brokopondo projects.

**Debt**

During 1960, total debt of the company increased from \$437,726,095 to \$447,885,439, the latter amount equivalent to 59 per cent of the shareholders' equity in the company at the end of the year, a slight reduction from the previous year-end amount. Long-term debt decreased \$24,713,656, but this decrease was offset by short-term borrowings. Short-term debt increased during 1960 in an amount of \$34,875,000 for the purpose of continuing the capital expenditure program initiated in 1960 and continuing in 1961. It is expected that short-term debt will be increased moderately during 1961.

As a result of open market transactions, the company acquired, and submitted to the trustee for cancellation, sufficient securities of its four outstanding debenture issues to satisfy all the mandatory sinking fund requirements for 1961 and \$1,231,000 applicable to sinking fund requirements for 1962. In addi-



[fol. 4768]

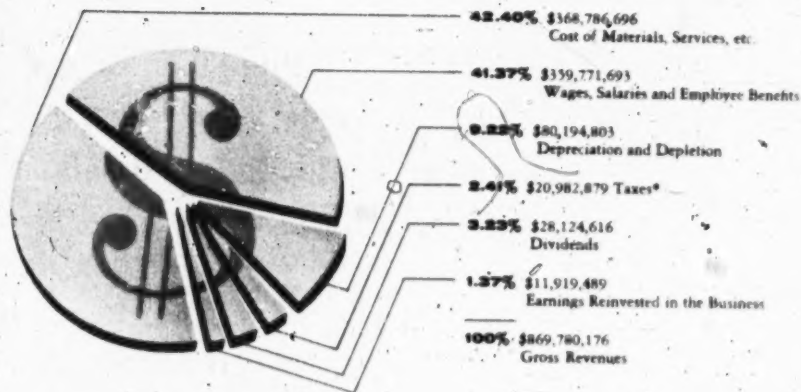
tion, the annual installment of \$2,500,000 due January 1, 1961 on the 2.55 per cent note was paid December 31, 1960.

The following table details the mandatory debt retirement schedule of outstanding long-term debt at December 31, 1960:

	(In Thousands of Dollars Per Year)					Notes		
	Debentures							
Due:	3 1/4% 1964	3% 1979	4 1/4% 1982	3 1/4% 1983	2.55% 1967	5% 1973	Annual Total	
1961	None	None	None	None	None			
1962	\$10,000	\$ 2,948	\$ 5,171	\$ 5,200	\$ 2,500		\$ 25,819	
1963	10,000	4,150	5,200	5,200	2,500		27,050	
1964	12,500	4,150	5,200	5,200	2,500		29,550	
1965/67		4,150	5,200	5,200	2,500		17,050	
1968		4,150	5,200	5,200			14,550	
1969/73		4,150	5,200	5,200		\$12,000	26,550	
1974/78		4,150	5,200	5,200			14,550	
1979		4,550	5,200	5,200			14,950	
1980/81			5,200	5,200			10,400	
1982			5,400	5,200			10,600	
1983				5,400			5,400	
Long-Term Debt	\$32,500	\$73,98	\$109,371	\$114,600	\$15,000	\$60,000	\$405,369	

The above table does not include miscellaneous long-term debt, principally of subsidiaries, in the amount of \$7,641,439, which is payable in varying amounts over a period of approximately 15 years.

#### DISTRIBUTION OF 1980 GROSS REVENUE DOLLAR



\*Although taxes are only 2.41% of money taken in, they represent 34.38% of earnings before taxes.

**Employees' Stock Option Plan**

At the annual shareholders' meeting on April 17, 1952, the current equivalent of 1,956,292 shares of the common stock of the company were reserved for purposes of the Employees' Stock Option Plan by action of the shareholders. At December 31, 1960,

322,258 shares remained reserved for the granting of future options.

The following table details certain information with respect to shares covered by options during 1960:

Covered by unexercised options at beginning of year .....	515,874
Purchased during the year .....	30,875
Covered by options cancelled during the year .....	925
Covered by options expired during the year .....	1,450
Covered by unexercised options at end of year .....	<u>33,250</u>
	<u>482,624</u>

All unexercised options are presently exercisable except the options covering 217,200 shares granted in 1959, which become exercisable two years from the

date they were granted, or upon such earlier date when the optionee either attains age sixty-five or dies while in the employ of the company.

**Source and Application of Funds during 1960 and 1959**

Source of Funds	1960		Application of Funds	1960	
	1960	1959		1960	1959
Net income	\$ 40,044,105	\$ 35,779,834	Additions to pension plans and retirement fund net increase of \$16,159,146 in 1960 and \$10,425,664 in 1959	\$ 70,172,161	\$ 46,433,888
Depreciation and depletion	80,194,803	73,268,312	Payments on long-term debt	27,143,147	35,768,341
Reduction in reserve for future taxes on income	(3,148,280)	(1,855,964)	Dividends declared:		
Other	406,422	1,422,123	Preferred stock	2,474,688	2,474,688
Total from operations	\$117,497,050	\$128,597,325	Common stock	25,649,928	23,343,928
Funds from sale of common stock	954,673	1,305,540	Income on investments, net	5,869,177	1,204,340
Working capital at annual acquisition at date of acquisition	6,857,067	11,853,837	Income on investments and advances, net	8,512,906	2,073,100
			Other	915,887	100,000
			(Change) increase in working capital	\$140,737,889	\$115,133,265
Total	\$125,288,790	\$141,416,701	Total	<u>(15,449,099)</u>	<u>28,243,457</u>
				<u>\$125,288,790</u>	<u>\$143,382,722</u>



## CONSOLIDATED BALANCE

## ASSETS

	December 31	
	1990	1989
<b>Current Assets:</b>		
Cash .....	\$ 40,731,973	\$ 44,337,462
United States Treasury Bills, at cost .....	16,723	10,782,387
Marketable securities, at cost .....	—	7,397,865
Accounts and notes receivable:		
Customers, less allowances: 1960, \$3,147,141; 1959, \$2,662,212 .....	108,284,180	112,168,028
Other .....	6,902,357	4,741,078
Inventories (Note B) .....	259,997,082	224,025,511
Prepaid insurance and taxes .....	5,169,387	5,209,561
<b>Total Current Assets .....</b>	<b>421,101,702</b>	<b>408,661,892</b>
<b>Investments, at cost:</b>		
Subsidiaries not consolidated .....	2,812,224	3,128,880
Other .....	34,707,342	28,521,709
<b>Total Investments .....</b>	<b>37,519,766</b>	<b>31,650,589</b>
<b>Other Assets and Deferred Charges:</b>		
Indemnity and surety deposits .....	1,106,939	1,097,226
Receivables and advances—noncurrent .....	32,075,003	23,562,097
Deferred exploration and mining expenses .....	4,206,119	4,060,631
Other deferred charges .....	8,504,351	8,868,265
<b>Total Other Assets and Deferred Charges .....</b>	<b>45,892,412</b>	<b>37,588,219</b>
<b>Properties, Plants and Equipment, at cost:</b>		
Land and land rights, including mines .....	65,567,764	59,646,533
Structures, machinery and equipment .....	1,558,727,238	1,489,486,655
	1,624,295,002	1,549,133,188
Less, accumulated allowances for amortization, depletion and depreciation .....	797,266,193	731,220,615
	827,028,809	817,913,173
Construction work in progress .....	41,174,438	53,067,350
Patents and other intangible assets, less amortization .....	1,417,021	1,454,136
<b>Total Properties, Plants and Equipment .....</b>	<b>869,620,268</b>	<b>872,434,659</b>
	<b>\$1,374,134,148</b>	<b>\$1,350,335,359</b>

The appended notes are an integral part of the financial statements.

**DE SHEETS** December 31, 1960 and 1959**LIABILITIES**

	December 31	
	1960	1959
<b>Current Liabilities:</b>		
Notes payable: banks, \$34,000,000; other, \$875,000 .....	\$ 34,875,000	\$ —
Accounts payable .....	28,167,379	28,778,662
Dividends on preferred and common stock .....	7,631,494	7,548,825
Accrued salaries, wages, vacation allowance and other compensation .....	21,757,780	22,731,634
Provision for taxes, including taxes on income, less, in 1959, \$9,752,771 of United States tax anticipation notes .....	9,493,032	21,279,547
Other current liabilities .....	14,558,629	7,582,348
Long-term debt due within one year .....	768,837	1,442,226
<b>Total Current Liabilities</b> .....	<u>117,252,151</u>	<u>89,363,242</u>
<b>Long-Term Debt, less amount due within one year (Note C)</b> .....	<u>412,241,602</u>	<u>436,283,869</u>
<b>Deferred Credits, Reserves and Noncurrent Liabilities</b> .....	<u>6,686,219</u>	<u>9,764,984</u>
<b>Reserve for Future Taxes on Income</b> .....	<u>78,744,005</u>	<u>81,892,285</u>
	<u>614,923,977</u>	<u>617,304,380</u>

**SHAREHOLDERS' EQUITY**

<b>Capital Stock:</b>		
Serial Preferred Stock, par value \$100 per share:		
Authorized 1,000,000 shares;		
\$3.75 Cumulative Preferred Stock, redeemable at \$100 per share;		
Authorized 660,000 shares; issued 659,909 shares .....	65,990,900	65,990,900
Common Stock, par value \$1.00 per share:		
Authorized 50,000,000 shares;		
Issued: 1960, 21,313,857 shares; 1959, 21,038,293 shares .....	21,313,857	21,038,293
<b>Additional Capital</b> .....	<u>44,044,790</u>	<u>42,558,078</u>
<b>Retained Earnings</b> .....	<u>627,860,624</u>	<u>603,443,708</u>
<b>Total Shareholders' Equity</b> .....	<u>759,210,171</u>	<u>733,030,979</u>
	<u>\$1,374,134,148</u>	<u>\$1,350,335,359</u>

**STATEMENT OF Consolidated Income and Retained Earnings**

For the years ended December 31, 1960 and 1959

	1960	1959
Net sales and operating revenues .....	\$ 861,211,772	\$ 858,460,213
Income from securities and investments .....	2,221,562	2,942,240
Gain on sales of capital assets and investments .....	3,022,331	474,584
Other income .....	3,324,311	3,090,685
Gross revenues .....	869,780,176	864,967,722
Cost of goods sold and operating expenses .....	590,154,919	562,941,391
Selling, general administrative and other expenses .....	122,048,668	107,683,161
Provision for depreciation and depletion .....	80,194,803	73,060,312
Interest expense .....	16,354,802	17,014,853
Taxes, not including social security and United States and foreign taxes on income .....	13,882,879	13,697,151
Total costs and expenses .....	822,636,071	774,396,868
Income before United States and foreign taxes on income .....	47,144,105	90,570,854
Provision for United States and foreign taxes on income:		
Current .....	10,248,280	36,855,964
Less: Reduction in reserve for future taxes on income .....	(3,148,280)	(1,855,964)
	7,100,000	35,000,000
Net income for the year .....	40,044,105	55,570,854
Retained earnings, beginning of year .....	603,443,708	565,112,199
Addition resulting from acquisitions of subsidiaries (Note A) .....	12,497,427	10,477,286
	655,985,240	631,160,339
Dividends declared:		
On preferred stock—\$3.75 per share .....	2,474,688	2,474,688
On common stock—\$1.20 per share .....	25,649,928	25,241,943
	28,124,616	27,716,631
Retained earnings, end of year .....	\$ 627,860,624	\$ 603,443,708

**STATEMENT OF Consolidated Additional Capital**

For the years ended December 31, 1960 and 1959

	1960	1959
Additional capital, beginning of year .....	\$ 42,558,078	\$ 35,392,800
Addition resulting from acquisitions of subsidiaries (Note A) .....	562,914	5,999,830
Excess of amounts received over the aggregate par value of common stock issued under Employees' Stock Option Plan .....	923,798	1,165,448
Additional capital, end of year .....	\$ 44,044,790	\$ 42,558,078

The appended notes are an integral part of the financial statements.

TEN-YEAR SUMMARY *Aluminum Company of America and consolidated subsidiaries*

Year ended December 31.

	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959
<b>Earnings</b>										
Gross Revenues	\$869,780,176	\$864,967,722	\$758,143,787	\$875,461,218	\$869,785,315	\$848,745,207	\$713,004,925	\$711,073,898	\$584,005,750	\$539,613,017
Cost of Materials, Services, etc.	368,786,696	352,189,001	313,601,940	332,229,358	307,704,742	320,561,827	279,403,298	268,885,592	218,860,371	193,770,755
Wages, Salaries and Employee Benefits	359,771,693	335,450,404	291,784,036	326,978,229	325,902,506	294,726,544	264,236,167	271,657,895	230,218,277	199,107,427
Depreciation and Depletion	80,194,803	75,060,312	65,639,603	57,658,506	50,770,834	45,114,035	40,653,031	34,047,688	26,087,475	21,657,123
Taxes	20,982,879	48,697,151	44,212,978	83,026,664	97,786,200	100,741,993	66,837,274	76,007,508	61,477,139	85,227,418
Net Income	40,044,105	55,570,854	42,885,230	75,568,461	80,621,033	87,600,808	61,875,155	60,495,215	47,362,488	39,852,294
Preferred Stock Dividends	2,474,688	2,474,688	2,474,689	2,474,689	2,474,690	2,474,691	2,474,692	2,474,694	2,474,694	2,474,694
Common Stock Dividends	25,649,928	25,241,943	24,767,339	24,728,326	24,642,644	21,376,494	16,058,638	15,720,917	14,682,042	13,449,516
<b>Financial Position</b>										
Working Capital	303,849,551	319,298,650	293,035,238	187,788,303	189,690,821	224,558,263	182,698,781	89,750,069	98,635,365	68,397,626
Properties, Plants and Equipment, Net	869,620,268	872,434,659	892,378,343	884,227,504	744,655,938	664,993,115	640,865,349	621,102,591	545,337,283	379,597,615
Investments and Other Assets, Net	76,725,959	59,475,824	48,175,015	42,389,527	31,898,547	25,199,889	32,829,608	36,407,289	78,033,939	56,790,518
Long-Term Debt	412,241,602	436,283,869	462,697,480	358,919,526	273,281,901	308,372,943	336,350,713	294,704,024	325,940,671	123,570,223
Future Income Taxes	78,744,005	81,892,285	83,748,249	84,954,615	71,832,224	51,242,931	33,769,919	17,231,644	4,747,035	566,456
Shareholders' Equity	759,210,171	733,030,979	687,140,865	670,531,193	621,071,201	555,135,395	486,273,106	435,304,281	391,318,881	360,649,080
<b>Per Share Data</b>										
Per Share of Common Stock										
Net Income	1.76	2.52	1.96	3.55	4.24	4.18	2.95	2.95	2.29	1.91
Dividends Declared	1.20	1.20	1.20	1.20	1.20	1.05	.80	.80	.75	.69
Taxes	.98	2.31	2.14	4.03	4.76	4.94	3.32	3.86	3.14	4.36
Equity	32.52	31.71	30.09	29.34	27.01	24.60	20.90	18.76	16.61	15.06
Number of Shareholders										
Preferred Stock	3,764	3,892	3,911	4,010	4,093	4,228	4,282	4,478	4,553	4,628
Common Stock	26,129	25,355	23,715	23,295	20,499	16,029	11,625	10,784	9,901	9,558
Capital Expenditures	80,341,301	54,660,992	81,599,867	207,500,256	139,310,818	79,521,316	67,151,034	119,407,886	198,338,289	79,710,625
Average Number of Employees	48,692	47,391	44,281	54,640	58,486	56,774	54,652	58,376	52,120	49,320

Share amounts have been adjusted where applicable to give effect to stock split-ups in 1953 and 1955, and are based on the number of shares outstanding at the end of the year.

The stock exchange ticker tape symbol for the common and preferred stock of Aluminum Company of America is AA.

## AUDITORS' REPORT

TO THE SHAREHOLDERS AND  
BOARD OF DIRECTORS,

ALUMINUM COMPANY OF AMERICA:

We have examined the consolidated balance sheet of Aluminum Company of America and consolidated subsidiary companies as of December 31, 1960, and the related statements of consolidated income and retained earnings and additional capital for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying consolidated financial statements present fairly the financial position of Aluminum Company of America and consolidated subsidiary companies at December 31, 1960, and the results of their operations for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

LYBRAND, ROSS BACH & MONTGOMERY

Pittsburgh, Pa.  
February 1, 1961

## CORPORATE

## COMMON STOCK

Pittsburgh: Pittsburgh National Bank  
New York: Morgan Guaranty Trust Company of  
New York

## PREFERRED STOCK

Pittsburgh: Pittsburgh National Bank  
New York: Bankers Trust Company

## STOCK TRANSFER AGENTS

## COMMON STOCK

Pittsburgh: Mellon National Bank & Trust Company  
New York: Bankers Trust Company

## PREFERRED STOCK

Pittsburgh: Mellon National Bank & Trust Company  
New York: First National City Trust Company

Aluminum Company of America is incorporated  
in the Commonwealth of Pennsylvania.

COMMON STOCK of Aluminum Company of America  
is listed on the New York Stock Exchange.

PREFERRED STOCK of Aluminum Company of America  
is admitted to trading on the American Stock  
Exchange.



# NOTES

to consolidated financial statements

**NOTE A.** On January 19, 1960, 180,480 shares of Alcoa common stock were issued to Res Magnet Wire Company, Inc. for the assets of that company and Alcoa assumed the obligations of Res. On January 23, 1960, 64,209 shares of Alcoa common stock were issued to the shareholders of Cupples Products Corporation in exchange for all of the outstanding shares of that company. These acquisitions were treated as poolings of interests for accounting purposes as was the acquisition of Rome Cable Corporation in 1959.

**NOTE B.** Inventories are carried at the lower of cost or market, with cost being determined for substantially all inventories under the last-in first-out method. The classification of the inventories follows:

	December 31	
	1960	1959
Finished goods .....	\$ 71,252,430	\$ 65,969,312
Work in process .....	138,260,447	108,541,898
Bauxite and alumina .....	23,342,917	22,485,614
Purchased raw materials .....	15,354,351	15,059,350
Operating supplies .....	11,786,737	11,969,337
	<u>\$259,997,082</u>	<u>\$224,025,511</u>

## NOTE C. Long-term debt comprises:

	December 31	
	1960	1959
Sinking fund debentures:		
3½%, due February 1, 1964 .....	\$ 52,900,000	\$ 40,223,000
3½%, due June 1, 1970 .....	73,898,000	78,722,000
4½%, due January 1, 1982 .....	109,371,000	115,142,000
3½%, due April 1, 1985 .....	114,600,000	119,422,000
Notes payable:		
2.35%, due January 1, 1967 .....	15,000,000	17,500,000
3%, due December 1, 1975 .....	60,000,000	60,000,000
	<u>405,568,000</u>	<u>431,009,000</u>
Miscellaneous, principally debt of subsidiaries .....	7,641,418	6,717,091
Total long-term debt .....	<u>\$13,910,459</u>	<u>\$37,726,091</u>
Less, amount due within one year included in current liabilities .....	<u>768,937</u>	<u>1,442,226</u>
	<u>\$412,241,602</u>	<u>\$456,383,869</u>

**NOTE D.** Costs of retirement plans charged to income amounted to approximately \$12.3 million for 1960 and \$10.5 million for 1959. The actuarially estimated past service cost of the plans not funded at December 31, 1960, was \$12.7 million.

**NOTE E.** During 1960, the United States Government brought suit against Alcoa claiming that the acquisition of Rome Cable Corporation in 1959 for a consideration of 355,226 shares of Alcoa common stock violated Section Seven of the Clayton Act. There is no monetary liability asserted in connection with this case, but if the Government is successful, the likely relief would be a requirement that Alcoa divest itself of Rome. Alcoa is vigorously defending against this action.

**NOTE F.** Reference is made to the section of this Annual Report titled "Financial Review of 1960" for information with respect to capital expenditures, commitments, long-term debt and employees' stock option plan.

### ALCOA BUILDING PRODUCTS, INC.

Sells aluminum residential building products.

### ALCOA EXPLORATION COMPANY

Conducts bauxite mining operations in the Dominican Republic.

### ALCOA GENERATING CORPORATION

Owens the power plant which furnishes power to the Warrick works near Evansville, Indiana.

### ALCOA INTERNATIONAL, INC.

Sells aluminum products in foreign markets, holds stock of a partially owned company and wholly owned subsidiary company, and owns ships used for transporting bauxite from Suriname, Trinidad and the Dominican Republic to the United States.

### ALCOA INTERNATIONAL (U.K.) LIMITED

Solicits orders in the United Kingdom and Europe for all those Alcoa products sold by Alcoa International, Inc.

### ALCOA MINERALS INC.

Inactive.

### ALCOA MINERALS OF JAMAICA, INC.

Holds and is developing bauxite reserves in Jamaica.

### ALCOA OF COSTA RICA, INC.

Holds bauxite concessions in Costa Rica.

### ALCOA PROPERTIES, INC.

Owens coal properties in Indiana and Kentucky, to supply fuel for power generation at the Warrick works, near Evansville, Indiana, and at a possible future smelter near Sturgis, Kentucky.

### ALCOA SECURITIES CORPORATION

Holds stock of certain partially owned affiliated companies, and other securities.

### ALCOA SERVICE CORPORATION

Renders building services, and owns certain sales office buildings and other real estate.

### ALCOA STEAMSHIP COMPANY, INC.

Owens, charters and operates ships transporting bauxite from Suriname, Trinidad and the Dominican Republic to the United States, and offers commercial service between United States East Coast and Gulf Coast ports and the Caribbean.

### ALTON AND SOUTHERN RAILROAD

Owens and operates a belt line and terminal railroad in the vicinity of the East St. Louis, Illinois, works.

### ALUMINIO ALCOA (VENEZUELA) S.A.

Holds capital stock of partially owned affiliated companies in Venezuela.

### BAUXITE & NORTHERN RAILWAY COMPANY

Owens and operates a railroad in the vicinity of the Bauxite, Arkansas, works.

### CEBADA RAPIDS TRANSMISSION COMPANY, LIMITED

Owens and operates electric transmission lines in Canada, transmitting electric energy for use at the Massena, New York, works.

### COLUMBIA RIVER ORCHARDS COMPANY

Operates fruit orchards owned by Alcoa in the vicinity of the Wenatchee, Washington, works.

### COMPANIA MINERA NUEVO LEON, S.A.

Explores for fluorapatite in Mexico.

### CUPPLES PRODUCTS CORPORATION

Fabricates, sells, and installs aluminum architectural products.

### LAVACA PIPE LINE COMPANY

Owens and operates gas pipe lines to transport natural gas to the Point Comfort, Texas, works.

### LID-ONE STEAMSHIP COMPANY, INC.

Owens and operates ships transporting bauxite from Suriname, Trinidad and the Dominican Republic to the United States.

### LONG SAULT, INC.

Owens and operates electric transmission lines and a water distribution system at the Massena, New York, works.

### MASSENA TERMINAL RAILROAD COMPANY, THE

Owens and operates a railroad in the vicinity of the Massena, New York, works.

### MANTANALA POWER AND LIGHT COMPANY

Owens and operates hydroelectric power plants and an electric utility system in western North Carolina.

### PLEASANT HILLS WATER COMPANY

Sells water in the town of Riverdale, Iowa, near the Davenport, Iowa, works.

### POINT COMFORT & NORTHERN RAILWAY COMPANY

Owens and operates a railroad in the vicinity of the Point Comfort, Texas, works.

### POINT COMFORT WATER COMPANY

Furnishes water for the Point Comfort, Texas, works.

### POST-MART, INC.

Sells a variety of household products.

### REA MAGNET WIRE COMPANY, INC.

Manufactures and sells the smaller sizes of magnet wire, a product which is used in coil windings, transformers, motors and other electrical and electronic equipment.

### ROCKDALE SANDOW & SOUTHERN RAILROAD COMPANY

Owens and operates a railroad in the vicinity of the Rockdale, Texas, works.

### ROME CABLE CORPORATION

Manufactures and sells various aluminum and copper products for the electrical industry.

### SURINAME ALUMINUM COMPANY

Mines bauxite on lands held under concession from the Suriname government; and is constructing hydroelectric power and smelting facilities in Suriname.

### SURINAME TRANSPORT COMPANY, N.V.

Owens floating equipment used for mine dredging and ship towing in Suriname.

### TAPOCO, INC.

Owens and operates the Tallassee Project, a federally licensed hydroelectric development consisting of four power plants in North Carolina and Tennessee, to furnish power to the Alcoa, Tennessee, works.

### WEAR-EVER ALUMINUM, INC.

Sells Wear-Ever aluminum cooking utensils, Kensington giftware, Cutco cutlery, Westnorland sterling and Alcoa Wrap.

### WEAR-EVER INTERNATIONAL, INC.

Sells Wear-Ever aluminum cooking utensils and Cutco cutlery in Latin America.

### YADKIN, INC.

Owens and operates the Yadkin Project, a federally licensed hydroelectric development consisting of four power plants (three in operation and one under construction) in North Carolina, to furnish power to the Badin, North Carolina, works.



[fol. 4777]

**1960 ALCOA  
ANNUAL REPORT**

**ALUMINUM COMPANY OF AMERICA**

1501 Alcoa Building, Pittsburgh 19, Pa.

[fol. 4778] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 50

**The Electrical Applications of Aluminum in the  
Building Industry**

Prepared for The Aluminum Company of America, New  
Kensington, Pennsylvania by The Firm of Edward E.  
Ashley

**Consulting Engineers**  
10 East 40th Street, New York 16, N. Y.

[fol. 4479]    The Firm of Edward E. Ashley  
                 Consulting Engineers  
                 10 East 40th Street  
                 New York 16, N. Y.

July 18, 1957.

Re: Aluminum Report, Job No. 5-567  
Aluminum Company of America,  
New Kensington, Pennsylvania.

Attention: Messrs. Harry L. Smith, Jr., Vice President and  
Robert R. Cope, Head, Electrical Section, Development  
Division

Gentlemen:

In accordance with our letter of proposal of August 30, 1955, and your subsequent authority, dated October 17, 1955, we have prepared the accompanying report entitled "The Electrical Applications of Aluminum in the Building Industry."

The scope of the content of this Report is considerably broader and more general than originally anticipated. This development came about as a natural growth as we proceeded with our investigations.

Instead of being able to confine ourselves to a comparative study of several electrical aspects in a single office building, we found that a long chain of inter-related material had to be explored and hence it will be found the report covers the application of aluminum to virtually all areas of electrical use throughout the building industry as a whole.

Our electrical contractor survey on the use of aluminum (Section 12 of this report) was not originally anticipated, nevertheless we felt that such an addition to our survey and studies would endow the report with a valuable practicality and an important analyses of the extent of current interest in the application of aluminum. The exceptional response to this survey indicates and verifies a deep interest in aluminum electrical applications among contractors. Evidence of a more universal interest is the desire of a leading architectural magazine to publish an article based on this survey.

Although we have made no mention of it in this report,

we have developed preliminary proposals for an Aluminum [fol. 4780] Educational and Training program for Electrical Contractors and Electricians and have succeeded in interesting Local #3 of the International Brotherhood of Electrical Workers. If the Aluminum Company of America, either alone or with other aluminum producers, can decide on the extent to which they wish to back such a program, the Union has indicated that they will make their facilities available for such instruction. We feel that this is an opportunity that should be strongly exploited, since we have found that a good deal of the resistance to the electrical use of aluminum is due, in a large degree, to misinformation or lack of information among Contractors and Engineers and the inadequacy in skill among electricians and journeymen in the application of aluminum for electrical installations.

Very truly yours, The Firm of Edward E. Ashley,  
Consulting Engineers, Edward E. Ashley.

EEA:hk

[fol. 4781]

## Introduction

This report is a general review of the principal electrical uses of aluminum in the building industry. Each of the twelve sections composing this report is an integral article dealing with a particular area. It is believed that these articles can be read with interest and profit by electrical contractors and consulting engineers.

In general, an attempt has been made to indicate the present status of the use aluminum in each area, to review the best recommended techniques for its utilization, and to evaluate the relative economic factors. A small amount of historical material, descriptions of existing installations, and a few hazarded forecasts help round out and coalesce the various sections.

Section No. 1 is both a general introduction to the aluminum field and a summary of the information and conclusions developed in the report. Sections 2 through 11 deal with the use of aluminum in the various electrical areas. The largest sections have been devoted to wire and cable, busways, and conduit, since these are the principal electrical items in most commercial and industrial structures. Other sections deal with switchgear, armored cables, sheet metal enclosures,

lighting fixtures, cast fittings and enclosures, and reactors, transformers and machines. The material in these sections has been derived from an extensive perusal of the consider- [fol. 4782] able literature in this field, from the catalogs and publications of the aluminum and electrical equipment companies, from commercial and governmental statistical publications, and from interviews with engineers, contractors and manufacturers.

To round out the report with a determination of the actual practical status of aluminum in electrical building construction, questionnaires were submitted to 400 leading electrical contractors. The response to this survey was unusually good and indicates a tremendous interest in the electrical application of aluminum. The data obtained have been tabulated and analyzed in Section No. 12.

This report confirms that aluminum can successfully be used in most of the areas hitherto dominated by copper and in many of the applications previously reserved for ferrous and other metals. For some important products, such as large busways, aluminum is now the more economical material. In others, such as transformers, the use of aluminum is practical, but not yet economical.

For many years, the electrical industry has been largely dominated by a single metal—copper. Production of copper over the years has been uneven; and in times of crisis, the metal would be in short supply or even disappear completely from the commercial market. Price fluctuations, when not controlled by the government, are violent and have an unsettling influence on the planning of future construction.

Now, the electrical industry appears to be rapidly settling [fol. 4783] itself on a bi-metallic standard. It seems logical to suppose that the emergence of aluminum in a powerful competitive position will have a stabilizing influence on the price and quantity of copper, now that this metal no longer enjoys a monopolistic advantage. In the rapidly and continuously expanding industrial and commercial areas, an assured supply of conductor metal is a most welcome situation. For the security of the nation, this development is no less valuable.

The electrical manufacturing companies have to a large degree met the challenge and responsibility thrust upon them by the rise of aluminum in the electrical field. Many prob-



lems have been successfully and brilliantly solved by far-seeing programs of research and development. Aluminum designs have been developed for many products, some of them as yet uneconomical, but ready for production when future price changes or copper shortages alter the relative price picture.

It appears doubtful whether the consulting engineers and the electrical contractors are as cognizant of the present and future possibilities of aluminum in the electrical field. Yet their adequate knowledge of the uses and relative merits of aluminum electrical application and products is essential, if aluminum is to attain the wide utilization for which it is presently suitable, both from a practical and an economical viewpoint. It is hoped that this report will enlarge the electrical horizons of these engineers and contractors by providing a convenient compilation of pertinent information and comparative data on the electrical applications of aluminum in the building industry.

[fol. 4784] The Electrical Applications of Aluminum in  
the Building Industry

Table of Contents

Section No.	Title
1.	General.
2.	Conduit.
3.	Wire and Cable.
4.	Sheet Metal Enclosures.
5.	Large Switch Enclosures.
6.	Switchgear.
7.	Busways.
8.	Armored Cables.
9.	Reactors, Transformers and Rotating Machines.
10.	Lighting Fixtures.
11.	Cast Fittings and Enclosures.
12.	Present Status of Aluminum Electrical Use in the Building Industry, Based on Results of a Question- naire Survey.

[fol. 4785]

## Section No. 1

## General

The course of human history has been marked by a number of distinctive epochs which are identified by the characteristic material of the time, which man utilized to enlarge his capacities and which raised him above the level of his previous existence. Thus, we have the stone age, the bronze age, the iron age and the steel age. Now, in the latter half of the twentieth century, it appears we may be on the verge of a new and final era--the aluminum age.

There is good reason for this thesis. First of all, aluminum is undoubtedly the most versatile of all metals, being capable of functioning, thanks to its myriad of allied forms, in an almost unlimited number of applications which require such varied properties as electrical conductivity, lightness, strength, corrosion resistance, non-toxicity, heat conductivity, reflectivity, low emissivity, machinability, workability, weldability, ductility and other properties, either alone or in combination. Secondly, and probably of major future importance, is the fact that aluminum is the most common metallic element<sup>1</sup> in the earth's crust, being present to an extent of almost 8 per cent, about twice that of iron.<sup>2</sup>

[fol. 4786] 1. *Refining and Reduction of Aluminum Ore*

In its natural ore, bauxite, aluminum occurs in extremely intimate union with oxygen in the form of a hydrated oxide. The raw ore is first refined, usually at or near its place of origin. Refining is largely a chemical solution and precipitation process whose end result is relatively pure aluminum oxide (alumina) powder.

Because of the powerful chemical bonds uniting the aluminum metal with oxygen, an electrolytic reduction process is required to reduce the alumina to the pure aluminum metal. The basic process, invented in 1886, utilizes a reduction cell consisting of a carbon lined pot, a molten cryolite solution within which the alumina is dissolved and a carbon anode.

Extremely heavy, low-voltage electrical currents passing through the solution precipitate the aluminum metal to the

bottom of the pot and liberate oxygen at the anode. The oxygen consumes the carbon anode by uniting with it and escaping in the form of carbon dioxide.

## 2. *Electrical Energy Requirements*

The quantities of electrical energy required for aluminum production in modern pot-lines are relatively enormous and often require the entire output of conventionally sized power plants. The cost of this electrical energy is a very substantial portion of the total mill price of the aluminum ingots.<sup>4</sup>

[fol. 4787] Consequently, availability and cost of electrical energy largely govern the location of aluminum reduction plants. Thus, the major plants are usually located where huge water-power resources can be harnessed to supply vast amounts of energy at virtually unity load factor, since the reduction process is a continuous operation.

So important is this factor that it is feasible to transport alumina thousands of miles to refining plants utilizing plentiful and cheap electrical energy. A prime example is the vast, new Kitimat Works of the Aluminum Company of Canada. To this great industrial complex located in the wild frozen reaches of Northwest Canada, refined bauxite ore from such far-distant mining regions as Jamaica in the West Indies is shipped in freighters thousands of miles to be reduced, and then, in metallic form, shipped back thousands of additional miles to the major markets of Eastern Canada and the United States.

## 3. *Growth of Aluminum Use*

The growth of aluminum use is largely determined by the extent to which it can replace copper and iron. These two metals and aluminum are the great triumvirate of strategic industrial metals. Two principal groups of factors are involved, technological and economic.

In a technological sense, great progress is evident. Suitable electrical alloys have been developed to crowd copper out of a large portion of the bus conductor field and press with increasing potential on the rich building wire and cable industry. High strength, corrosion-resistant alloys give [fol. 4788] great promise as structural members and find

increasing application as building materials. In addition a large number of new and expanded uses are continuously developing. These range from the relatively recent and spectacular transformation of aluminum foil into a household staple to the development of a new all-automatic and vastly cheaper repeating rifle to replace the relatively heavy and expensive weapon hitherto the armed forces standard.

#### 4. *Relative Price Behavior*

Economically, aluminum has in the period between the end of World War II and today improved its relative position to a greater extent than any of the other common metals. Fig. #1 indicates that from the government-fixed prices of World War II to the end of 1956 aluminum rose about 75 per cent, pig iron 150 per cent, and copper 200 per cent. A perusal of charts and figures prepared by "American Metal Market" indicates that aluminum enjoys similar advantages with respect to tin, lead and zinc.

Going back even farther, it is interesting to note that today's basic aluminum ingot price of about 26¢ per pound is approximately the same as it was in 1926, when the dollar was worth about two or three times as much as today. Thus, during that period, it can be said that the basic cost of aluminum has decreased in the same ratio.

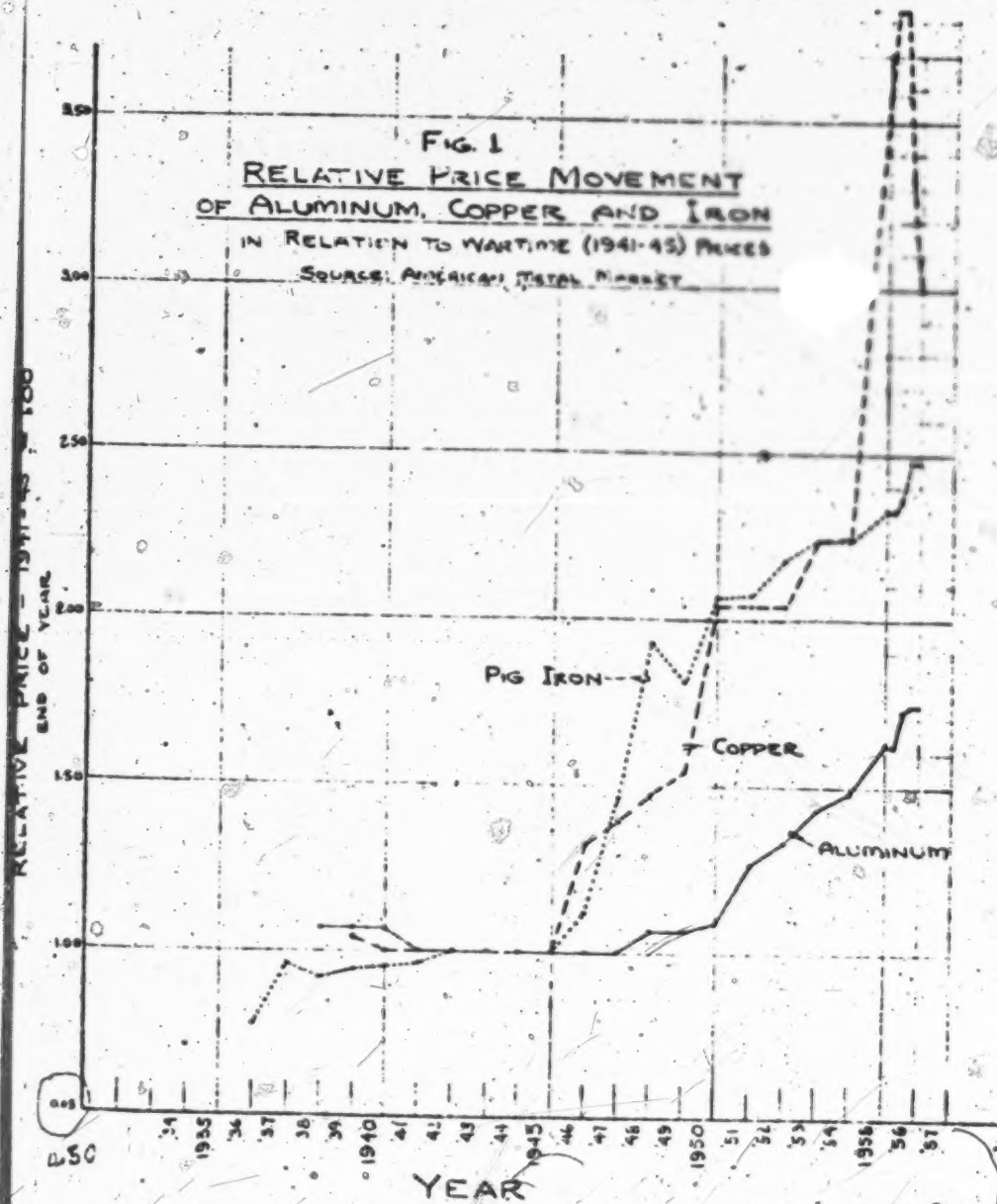
On the other hand, the prices of iron and the other non-ferrous metals have risen to levels more than twice as high as they were at that time. Moreover, while the price of



Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Calc By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): ☐ Dtg Rm. ☐ General File ☐ Estimate File ☐ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

FIG. 1  
RELATIVE PRICE MOVEMENT  
OF ALUMINUM, COPPER AND IRON  
 IN RELATION TO WARTIME (1941-45) PRICES

SOURCE: AMERICAN TITAN MARKET



[fol. 4790] aluminum has maintained a rather steady rate of change, the price of other metals have been characterized by sudden changes of considerable magnitude, as can be noted on Fig. 1 and by studying the price history of the various metals in the statistics of the Bureau of Mines and "American Metal Market".

#### 5. *Recent Increase in Aluminum Production*

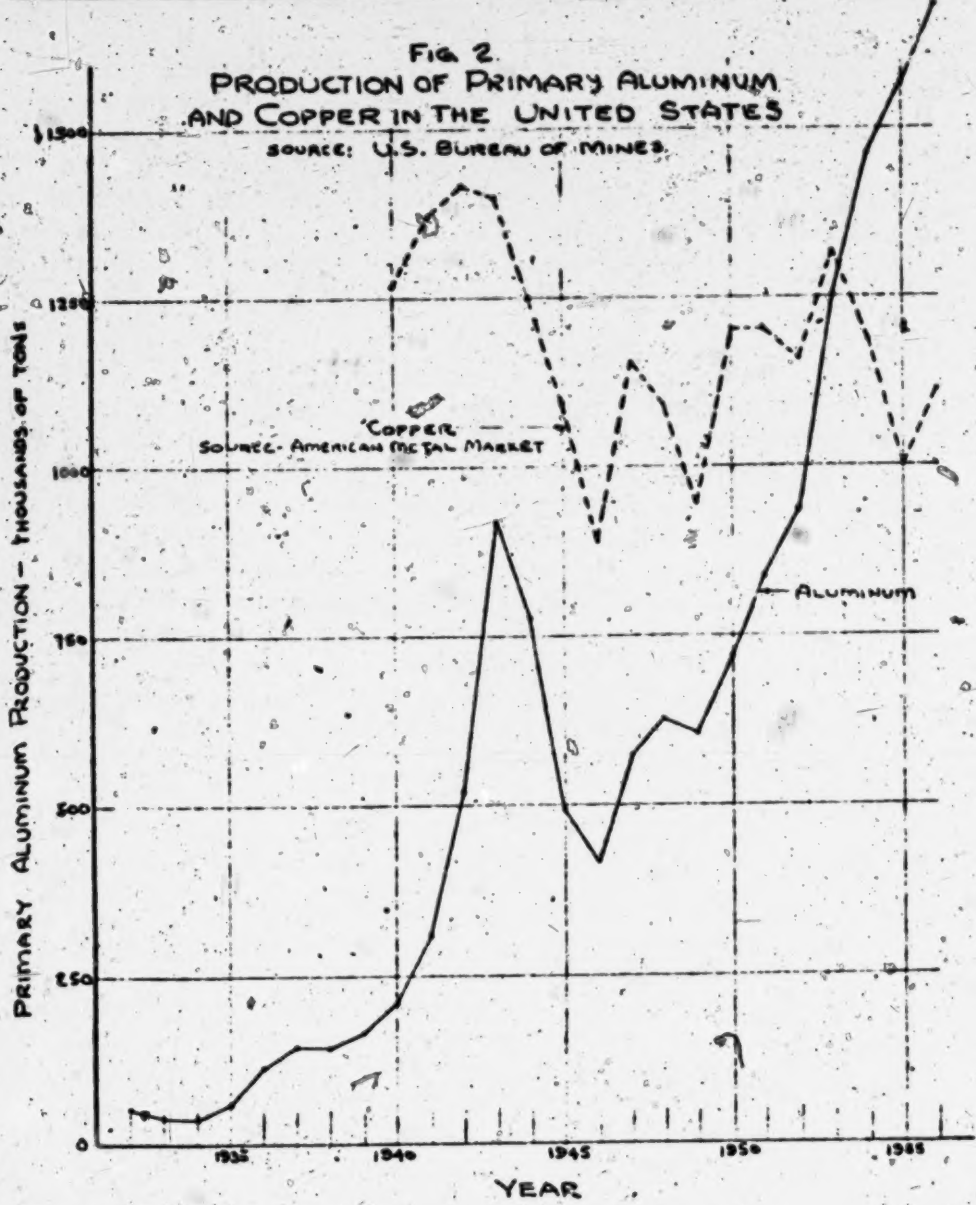
These technological and economic factors have combined to generate a spectacular recent growth rate in aluminum production, a rate which promises to continue, if anything, at an even more accelerated pace.

A glance at Fig. 2 reveals the truly remarkable and continuing increase in production. Since the post-war dip of 1946, aluminum production has quadrupled, while copper, arch-rival of aluminum in the electrical field, has yet to re-attain its peak World War II production. Also notable is the fact that in 1954, aluminum production exceeded copper for the first time and appears likely to do so henceforth by ever greater margins.

#### 6. *Comparison with Iron Production*

With respect to iron the story is, of course, different, since ferrous metals are still the basis of our economy, despite the promise and progress of aluminum. This is heavily underscored by the production figures tabulated below:

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Sales By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): ☐ Dtg. Rm. ☐ General File ☐ Estimate File ☐ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_



## [fol. 4792] Production—Millions of Tons of Primary Metal

	1946	1955
Aluminum.....	0.4 (100%)	1.6 (400%)
Pig Iron.....	45.6 (100%)	77.8 (170%)

Source: Annual Statistical Report, 1955. "American Metal Market."

Iron production has more or less kept pace with the general growth of the economy while aluminum has raced far ahead. There are indications that this pace may continue since progress is being made in the increased utilization of aluminum in automotive and railroad bodies, ship hulls and superstructures, containers and enclosures, household utensils and appliances and structural applications, all vast fields still dominated by the ferrous metals.

## 7. Aluminum Production Capacity and Producers

At any rate, the plans of the primary aluminum producers are definitely optimistic. Annual production capacity in the United States at the end of 1956 was somewhat more than 1¾ million tons. Installed capacity for the end of 1958 is expected to exceed 2½ million tons, an increase of about 40 per cent in two years.<sup>5</sup>

Moreover, while at one time, the Aluminum Company of America was the sole producer, there are now three more giants in the field—Kaiser Aluminum, Reynolds Aluminum and the Aluminum Company of Canada. In addition, several smaller companies in the United States and Canada are either producing or planning to produce primary aluminum.<sup>6</sup>

## [fols. 4793-4794] 8. Allocation of Aluminum Production

Although aluminum production now considerably exceeds that of copper, a considerably smaller proportion of aluminum is devoted to electrical use. Over the past two years, semi-annual figures released by the Aluminum Association indicate that the major categories of wrought aluminum products have maintained relatively constant percentages, approximately as follows:

Building Materials .....	20%
Consumer Durable Goods .....	12%

Transportation .....	17%
Electrical .....	8%

The major portion of the 8 per cent devoted to electrical use undoubtedly is used in the manufacture of high voltage transmission cable, mostly for ACSR, which for many years has been the industry standard in this field. An increasing amount is lately finding its way into the fabrication of bus-bars for use in high amperage bus-ways and in switchboards and switchgear. The major manufacturers of busway recently have been quoting aluminum conductor busway at 20 per cent less than the equivalent copper conductor busway.

#### 8. Recent Price Behavior—Copper and Aluminum

Since shortly after World War II, the relative cost of aluminum has been extremely favorable with respect to copper (see Fig. 1). At that time the price per pound of copper abruptly exceeded that of aluminum for the first time since the depression and has maintained the same relative position ever since. Indeed, the price difference continued to increase rapidly until in 1956, copper reached an unheard of high of 46 cents per pound while aluminum was selling for 26 cents per pound.

However, since June, 1956, the price of copper was affected by an equally spectacular fall until today, March, 1957, it is selling at a base price of 32-34 cents per pound. Meanwhile, aluminum has continued at 26 cents per pound. This behavior is reflected by the curves in Fig. 3.

#### 9. Effect of Favorable Price Situation

Needless to say, the suddenly magnified favorable price situation made aluminum immediately competitive with copper and extremely attractive to potential users, despite lack of experience in its use and certain technical difficulties, such as connections, which have since been largely solved. This favorable situation was and remains particularly true where relatively large amounts of conductors are required, as for example, bus bar and in the large circular mil cable sizes. It has also given added stimulus to



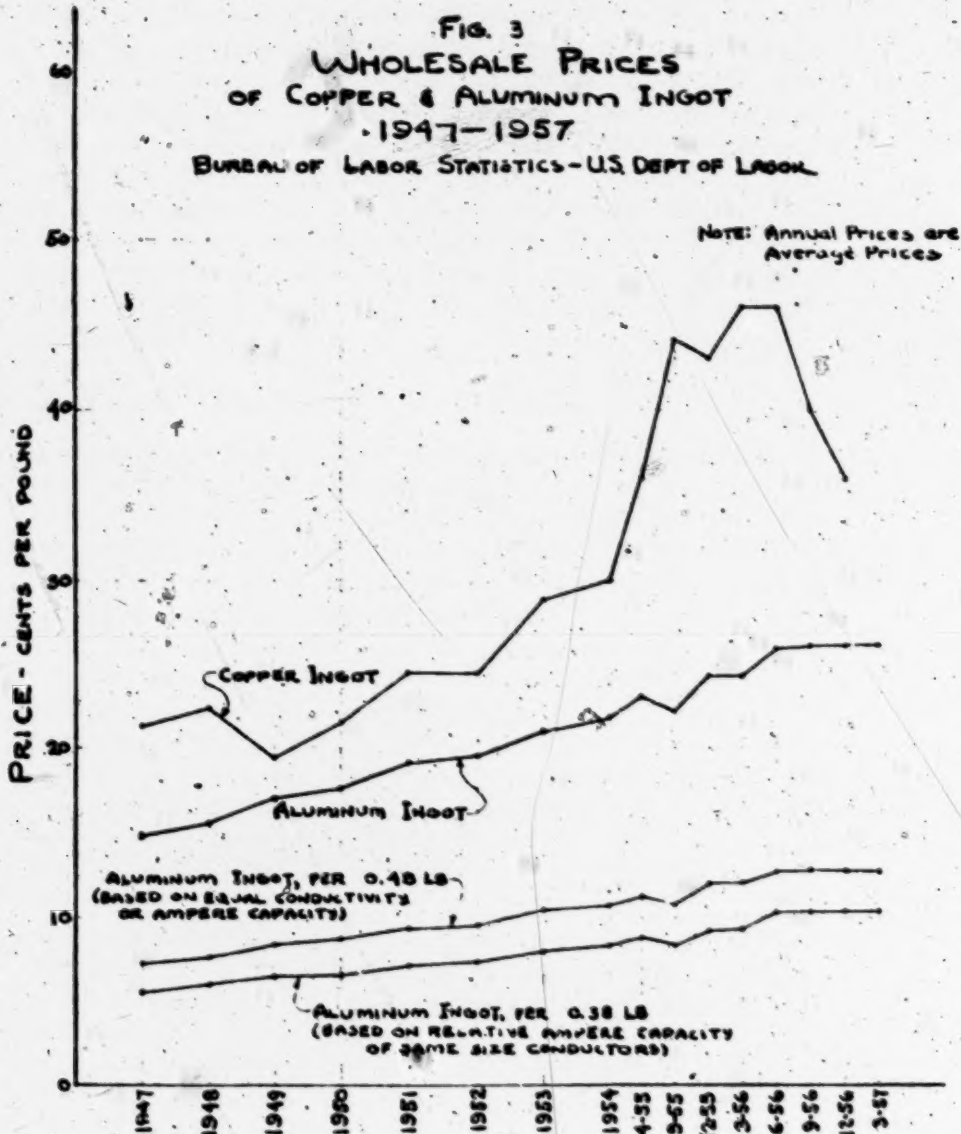
research and development efforts directed toward the replacement of copper in such products as motors, transformers, connectors, reactors, lamps, telephone frames, magnet wire and switchgear.

10. *Short Supply of Copper*

In addition to the impetus of existing price differentials, another

[fol. 4796]

Job Title Alum Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade ELEC Calc. By S. T. Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One) Dtg. Rm. General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_



[fol. 4797] powerful factor in pushing aluminum into every phase of the electrical industry has been the potential shortage of copper. This potential has been realized all too completely in periods of emergency, when the government has found it necessary to seize and control all supplies of copper, making it largely or completely unavailable to many segments of the electrical industry.

As far back as the 1930's and before, forward-looking manufacturers were aware that copper was approaching a chronic condition of short supply, while aluminum, one of the most plentiful elements in the earth's crust was potentially capable of maintaining a practically unlimited rate of rising production. Consequently, considerable developmental work was done on a wide range of products, so that when the inevitable conditions of scarcity or competitive price arrived, these products were immediately or shortly available in the market.

#### 11. *Present Aluminum Electrical Applications*

Thus, aluminum building cable is presently available in practically all sizes and insulations. Aluminum busway is outselling copper busway. Aluminum conductor reactors are available at lower prices than copper-reactors. Transformers, generators, and motors have been developed with aluminum windings. Incandescent lamp bases, after years of difficult development<sup>6</sup>, are now standard in aluminum. Aluminum conduit is becoming increasingly competitive and finding increased use. A tremendous range of conduit fittings is available in aluminum at competitive prices. Switch- [fol. 4798] gears and switchboards employ aluminum bus bars and sometimes aluminum enclosures as well. Aluminum cable trays are replacing steel trays as standard equipment. Aluminum is being used in a host of additional applications and products such as appliances, connectors, armored cable, electronic tube chassis, induction motor rotors, high-voltage switches, high-voltage switchyard bus and structure, turbine-generator windings and cooling fans, and high-capacity bus enclosures.

## 12. *Aluminum Cost as Function of Current Capacity*

Aluminum is less expensive than copper on a weight or volume basis. It has a lower volume conductivity, 61 per cent as compared to 99 per cent for copper; but because of its low specific gravity (2.70 as compared to 8.89) for copper, it is more than twice as conductive as copper on a mass-conductivity basis. The lowest curve of Fig. 3 indicates the relative cost of aluminum as compared to copper on an equal-size basis. The curve is based on the fact that aluminum cables of medium range sizes (#4/0 to 500 MCM) have an ampere capacity about 80 per cent as great as a copper cable of the same size. On this basis, it can be seen that as of Dec. 1956 copper cost was  $3\frac{1}{2}$  times as much as aluminum.

The second curve from the bottom of Fig. 3 is a measure of relative metal cost for equal ampere capacities. As explained in Section 2 (Wire and Cable) of this report, cable [fol. 4799] capacity is more a function of diameter rather than area. Consequently, an increase of capacity from 80 per cent to 100 per cent requires a cable with an area not 125 per cent as great, but roughly 156 per cent (125 squared) as great. However, relative metal price of aluminum is still only about  $\frac{1}{3}$  to  $\frac{2}{3}$  that of copper.

Of course, this is far from the relative economics of purchased cable, since manufacturing costs will tend to equalize cable costs, the more so as insulations and coverings become thicker and more complex.

Other factors which tend to equalize aluminum and copper costs are connector costs, generally greater for aluminum, and increased feeder conduit sizes required for many aluminum cables of carrying capacities equal to those of copper cables.

## 13. *Relative Aluminum and Ferrous Metal Prices*

When compared with iron and steel, the picture is different. Aluminum is considerably more expensive on either a mass or volume basis. However, its much lighter weight (about 35 per cent of steel) enables aluminum to overcome some of this price differential, although its smaller strength generally requires greater thickness for sheet metal work.

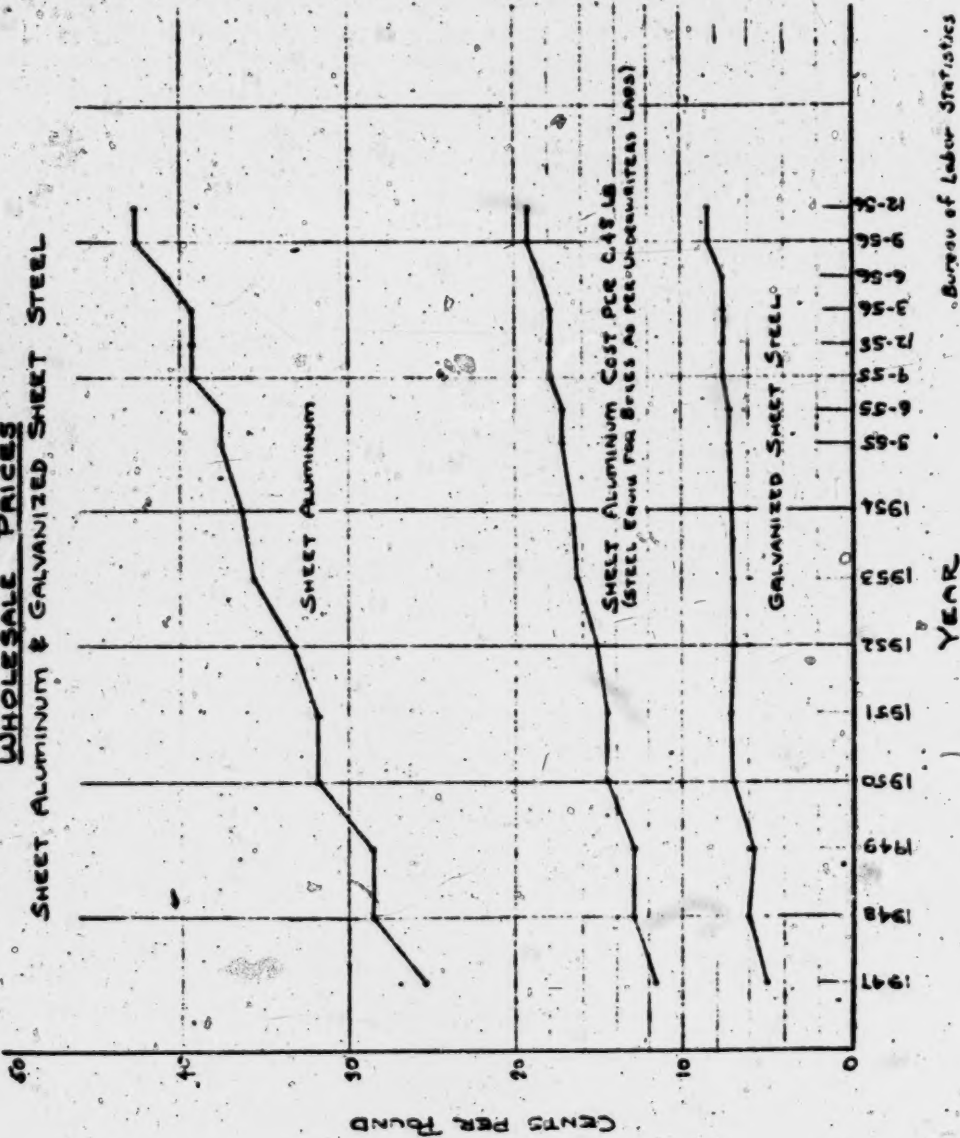
As shown on Fig. 4, aluminum sheet costs about five times as much as sheet steel, pound for pound, but there is only a 2 to 1 price difference for the actual material used for a given application. A similar or better relation exists in the structural field, where aluminum switchgear structures have been built with the same size structural members.



[fol. 4800]

Job Title Alum. Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date 6-25-56  
 Trade Elect. Sales By S. L. Jones Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): Dtg. Rm. General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

FIG. 4.  
**WHOLESALE PRICES**  
**SHEET ALUMINUM & GALVANIZED SHEET STEEL**



Bureau of Labor Statistics

[fol. 4801] 14. *Specific Strengths*

As a matter of fact, pound for pound, aluminum is not only the most conductive, but also the strongest of the common metals. Hard drawn aluminum of electrical conductivity grade is as strong as cold rolled steel, while the toughest of the wrought alloys of aluminum have specific tensile strengths (tensile ultimate strength divided by specific gravity) which exceed that of hard stainless steel. Below are typical values of specific tensile strengths for some metals and alloys:

Aluminum, 7075-T6 -----	28.1
Aluminum, 2024-T4 -----	24.6
Hard Stainless Steel, 302 -----	22.7
Magnesium, Hard -----	21.3
Aluminum, Electrical Conductivity grade, Hard Drawn, EC-H19 -----	10.0
Cold Rolled Steel, 1020 -----	9.55
Copper, Hard Drawn -----	6.5
Aluminum, Electrical Conductivity grade, $\frac{3}{4}$ Hard, EC-H26 -----	6.3
Aluminum, Electrical Conductivity grade, An- nealed, EC-0 -----	4.4
Copper, Annealed -----	3.6

15. *Aluminum Metallurgy*

It should be realized that when the term aluminum is used herein it is meant to apply broadly to the entire vast area of aluminum metals, particularly those in the electrical [fol. 4802] field. Pure aluminum metal by itself is of extremely little use. It is aluminum's versatile ability to combine with hundreds of combinations of different metals and produce hundreds of alloys of different properties tailored to specific uses that is its most valuable property. Aluminum is actually a system of metallurgy.

In its purest refined form aluminum has a conductivity of about 65 per cent, but is extremely weak and, of course, quite expensive to produce. The purest commercial form is electrical grade (EC) aluminum which has a minimum purity of 99.45 per cent and minimum conductivity of 61 per cent. EC aluminum is relatively weak in the annealed

state but can be heat-treated and cold-worked, as can most aluminum alloys, to attain required tensile strengths.

Aluminum is combined with many different alloying elements, but the principal ones are copper, manganese, silicon, magnesium, zinc and nickel. The properties of the various alloys derived therefrom are discussed in greater detail in the various sections of this report. In general, all the alloying elements add strength, but zinc alloys are the strongest, while nickel permits strength to be retained at high temperatures. Copper contributes good machinability, but lowers corrosion resistance. Silicon and magnesium are excellent for corrosion-resistance.

#### 16. *Aluminum Properties*

In addition to the primary electrical property of excellent volume and weight conductivity and the important structural property of high strength to weight ratio, [fol. 4803] aluminum and its alloys has other important characteristics which either reinforce or detract the suitability of aluminum for various electrical applications.

#### 17. *Corrosion Resistance*

Resistance to atmospheric corrosion makes aluminum eminently suitable for outdoor applications such as fixtures, for conduit installations in areas where maintenance is infrequent, difficult or dangerous and for use as conduit and armored cable in plants, such as paper mills, with atmospheres highly corrosive to ferrous products.

However, the strong oxide formation which is responsible for aluminum's admirable immunity to atmospheric attack makes for connection difficulties which, although easily overcome, have been and still are the most potent deterrent to the general use of aluminum conductors.

#### 18. *Galvanic Activity*

Aluminum's anodic position in the electrochemical or galvanic metal series makes its susceptible to destructive galvanic corrosion in the presence of strongly cathodic metals, such as copper. This tendency requires intelligent consideration and precautionary techniques when copper-alumi-

num joints are made in environments wherein such corrosion can take place.

[fol. 4804] 19. *Low Melting Temperature*

Relatively low melting temperature makes aluminum, particularly when alloyed with silicon, excellent for die-casting, a mass-production operation which enables aluminum fittings, condulets and connectors, as well as countless non-electrical items, to be produced competitively with ferrous equivalents which must be cast in sand or permanent molds.

20. *High Heat Conductivity and Emissivity*

High heat conductivity makes aluminum very suitable for enclosures. High reflectivity, an excellent property for aluminum insulating foil, is not good for electrical enclosures from which heat must generally escape. However, a dull coat of aluminum paint cures this trouble. However, high reflectivity (combined with good workability) makes aluminum ideal for lighting and heating reflectors.

21. *Non-Magnetic Property*

Energy losses within aluminum enclosures are further reduced by aluminum's non-magnetic property. This makes aluminum particularly applicable as enclosures for high current density members, especially for single phase enclosures.

22. *Non-Sparking Property*

The fact aluminum is non-sparking makes it a particularly valuable metal for use in hazardous locations. This property, combined with its light weight and castability, renders aluminum most suitable for explosion-proof fittings [fol. 4805] and enclosures, especially those of massive size.

23. *Good Workability*

Many cast and wrought alloys of aluminum have good formability and workability which reduces labor costs and makes aluminum useful for machined members.

## 24. *High Ductility*

Good ductility and relatively low strength in the annealed state permit aluminum to be easily drawn into wires and rods, to be extruded into myriads of cross-sectional shapes, to be deep drawn into cylindrical containers and to be spun to mathematical curvatures.

## 25. *Non-Toxicity*

Non-toxicity is hardly an electrical quality, but combined with aluminum's good heat-conductivity and workability it makes aluminum an excellent material for household utensils and electrically heated food containers.

## 26. *Appearance*

Good appearance is a highly subjective characteristic, but the silvery natural appearance of aluminum is attractive to many people and a not inconsiderable factor in its use and choice. In addition, aluminum is capable of taking on many unusual and colorful sheens and finishes by anodizing and dyeing processes.

## [fol. 4806] 27. *Lightness*

Undoubtedly the popular characteristic quality of aluminum is its relative lightness—only 2.7 times the density of water, or roughly one-tenth pound per cubic inch. It would be difficult to select an application, outside of ballast material, wherein this property does not contribute favorably in such ways as decreased labor costs, lower shipping and handling costs, increased safety, and contingent economies realized in other materials (such as structural supports).

## 28. *Early Electrical Uses*

Aluminum has been used in electrical applications for over sixty years. The first application was bus bars in 1895.<sup>(3,8)</sup>—All-aluminum cable was used as far back as 1902. Steel-reinforced, aluminum transmission cable (ACSR) was first used in 1909.<sup>(7)</sup> Insulated aluminum cables were being manufactured in the 1920's.<sup>(4)</sup>



## 29. *Electrical Applications Today*

Before the end of World War II, electrical applications of aluminum were virtually unknown in the building industry, except for the use of aluminum bus bars for massive industrial installations, particularly in aluminum reduction plants. Today, the use of aluminum is extensive in all bus applications and gives promise of imminent breakthrough on various fronts in the cable field. This report is primarily concerned with reviewing the various factors in this trend and the present status of aluminum in the various areas of use. On the basis of the information in this report, study [fol. 4807] of the literature, conversations and conferences with manufacturers, engineers and contractors, and a poll of several hundred leading electrical contractors, the relative applicability of aluminum to various electrical products ranges from dominant to nil. The following list is an estimated appraisal of the relative favorable applications of aluminum, most favorable items are at the top of the list:

- (1) High capacity low voltage buses.
- (2) Transmission cable.
  - (a) Long distance—(ACSR)
  - (b) Urban use.
- (3) Single Phase Enclosures (high capacity).
- (4) Low Impedance Bus Risers—600 Amperes and over.
- (5) Plug-in bus—600 amperes and over.
- (6) Reactors
- (7) Underground feeders in non-metallic duct (non-utility).
- (8) High voltage switchyard bus structure.
- (9) Outdoor Lighting Standards.
- (10) Outdoor lighting fixtures.
- (11) Switchgear and Switchboard bus.
- (12) Armored power cable (larger sizes).
- (13) Switch Enclosures (2,000 amperes and over)
- (14) Large cables in conduit (over 200 amperes capacity)
- (15) Cast Fittings (die cast)
- [fol. 4808]<sup>2</sup> (16) Cable Trays

- (17) Medium size cables in conduit (#6 to #4/0)
- (18) Conduit.
- (19) Cast boxes (sand castings)
- (20) Branch circuit Wiring.
- (21) Interior lighting fixtures.
- (22) General sheet metal enclosures.
- (23) Power transformers.
- (24) Distribution transformers.
- (25) Signal wiring.
- (26) Junction, outlet and pull boxes.

### 30. *Factors in Appraising Relative Favorable Use*

The above list should be considered only as a general guide. Economic application of aluminum depends on many factors other than material cost alone. Direct labor cost is the next most prominent consideration. However, true costs will also be affected by maintenance requirements, power losses and safety requirements. The extent to which these apply will, of course, vary for a particular installations. Thus, aluminum conduit, which at this time, is considerably costlier than steel, has been used in a recent feeder installation on the outer wall of a tall building because of maintenance and installation savings. Large switch enclosures are cheaper to purchase in steel, but magnetic power losses in the steel will more than offset the cost difference. On the other hand, cables of all kinds [fol. 4809] are cheaper in aluminum, but present new splicing problems, and for equal capacities often require larger conduit sizes.

In general, the first sixteen items will offer economic savings in aluminum, mostly on an initial cost basis, but also to varying degrees in labor, maintenance and other contingent costs. Among items (17) to (25), medium size cables in conduit can prove economical with the use of skillful labor. Likewise aluminum conduit for difficult installations. Branch circuit wiring (mostly #12 AWG wire size) has definite possibilities too little recognized at present. The remainder either await further technological development or at this time are too costly.

### 31. *Working with Aluminum*

A common disadvantage quoted by many experimenters and fabricators is the increased cost of working with aluminum. At the same time others will come forward with statements that labor costs are no greater and sometimes even less, or if they are greater, that reductions are expected as more experience is gained.

In general, it is our impression that the more optimistic views are held by those with greatest experience with aluminum, and that the greatest enthusiasm is manifested by those with the longest and most extensive records of working with aluminum.

It must be remembered that many aluminum joining and fabricating techniques are of relatively recent development and that most workers have little or no experience [fol. 4810] with these techniques. It is logical to expect continuing improvement and simplification in these methods on the one hand, and reductions in time and labor costs on the other in the face of increasing use and application.

Experience has shown that electricians easily learn how to splice and join aluminum by the various available methods from bolted to welded connections. The patent bugaboo of aluminum electrical connections has no longer a solid basis in reality. Likewise, with the proper tools and techniques, aluminum can be easily worked and fabricated in myriads of differing applications.

### 32. *Need for Educating Users and Workers*

Frequent conversations with various contractors and manufacturers reveal that many of them have what amounts to an ingrained reluctance to work with aluminum, although they have had little or no experience with aluminum. This stems from a natural conservative reaction to change in many cases, and in other cases to unfavorable experience resulting from using aluminum without sufficient knowledge of proper fabricating methods.

The passage of time will inevitably rectify this situation. However, considerable helpful impetus can result from properly directed and concentrated educational activity. On the one hand, this effort should be directed to teaching electricians and other skilled workers how to join,

fabricate, weld and work aluminum metals, so that labor inadequacy is no bar to economical utilization. On the [fol. 4811] other hand, the purchasers and users must be made more aware of the economic and other advantages of aluminum.

In particular, electrical contractors and consulting engineers should be made the targets of such educational and informative activities. Many contractors, because of ignorance or unfamiliarity, will unjustifiably increase cost estimates when aluminum conductors are specified. Consulting engineers, a most conservative breed, block the extension of aluminum use, often denying considerable savings to their clients, because of lack of information or because of the ingrained tendency to leave alone ancient specifications which have sufficed for countless previous jobs.

### 33. *Versatility of Aluminum*

Basically, aluminum is the most flexible of all metals and can be adapted to a tremendous variety of products and manufacturing processes. It can be drawn, bent, machined, forged, formed, spun and extruded. It can be riveted, brazed, flame-welded, arc-welded, flash-welded, resistance-welded and cold-welded. It can be painted, plated, specularized, brushed and anodized. It can be produced in a wide range of hardness, corrosion-resistance, machinability, ductility and strength.

However, this extreme versatility exacts a cost, and this cost is the need to be well-versed in the characteristics of the various aluminum alloys and in the techniques for their proper fabrication. The methods used with iron and steel [fol. 4812] or copper cannot be recklessly transferred to aluminum work. Aluminum is different, but it is not more difficult.

### 34. *Aluminum and the Future*

Aluminum is still in its vigorous, fast-growing youth, as indicated by the large annual increases which have occurred since World War II. New methods, new applications, improvements in existing techniques are being developed continuously. With the imminent exhaustion of long-mined copper and high grade iron resources in this country, alumi-

num looms as the metal of the future. To the entrepreneurs and manufacturers with the vision and initiative to accept and master the myriad applications of aluminum will go the rewards of the future.

[fol. 4813]

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[fol. 4814]

#### Section No. 3

#### Wire and Cable

The relative position of aluminum in the electrical sector of the economy will be determined in large measure by the extent to which aluminum is utilized as the conductor material in electrical wires and cables, still the dominant and characteristic electric material.



### 1. *Basic Advantages of Aluminum*

There are two basic significant factors today which are impelling aluminum to an ever larger portion of the electrical wire and cable market. Simply stated, these are as follows:

(a) Pound for pound, aluminum is more than twice as conductive as copper.

(b) The basic price per pound of aluminum during 1956 has been 55% to 65% that of copper. Now (March, 1957) after a precipitous drop in the price of copper, aluminum is at 80% of the copper price.

### 2. *Basic Advantages of Copper*

Opposed to these two great favorable factors are the two following disadvantages:

(a) The entrenched position of copper conductors.

[fol. 4815] (b) On a volumetric basis, the conductivity of copper is more than  $1\frac{1}{2}$  times as great as aluminum.

It is the interaction of these four general factors which explain the position of aluminum wires and cables today and which will determine that position tomorrow.

If choice were always made on the objective basis of a pure price comparison, it is safe to say that today aluminum conductors would be selected for most electrical installations, even though aluminum's lower volume conductivity, in many cases, requires larger conduit sizes and therefore higher conduit costs.

### 3. *Unfavorable Influences*

However it is the complex of influences arising from the long, practically exclusive use of copper for electrical wires and cables which in many cases offsets and brings to nought the apparent economic advantage of aluminum. These influences are exerted in many ways, both direct and indirect. A partial tabulation includes the following:

(a) Unwillingness on the part of many engineers, designers and contractors to take a chance on a new product (aluminum) as long as an old one (copper) performs satisfactorily.

(b) Resistance of electricians to learning the different handling and splicing techniques required for aluminum wires and cables.

(c) Inadvisability of introducing aluminum wires and cables in revisions of existing all-copper electrical installations.

[fol. 4816] (d) The fact that aluminum wires and cables are not yet such standard stock items as copper wires and cables.

(e) Unwillingness of suppliers to enlarge their inventory by duplicating their copper stock with additional stocks of aluminum wires and cables.

In general, the innate conservatism of engineers and designers will cause them to lose the economic benefits obtainable in many installations by using aluminum instead of copper. In many instances, such decisions are dictated by well-founded doubts concerning the ability of the electricians to make proper aluminum splices.

#### 4. *Conductivity and Weight Comparison*

The fact that on a weight basis aluminum is greatly superior to copper as an electrical conductor comes as a surprise to many people who are automatically accustomed to regard copper as the standard of electrical conductivity and think of conductance only on an area basis.

Fig. 1 is a graphic illustration of the superior characteristics of aluminum on a weight basis. Although No. 4/0 aluminum conductor weighs about the same as No. 2 copper conductor, it is about 25% stronger (in the fully hard-drawn tempers), twice as conductive, has  $1\frac{1}{2}$  times the rated current capacity (type RH insulation) and will carry its rated current with less than 90% of the voltage drop of the copper conductor.



[fol. 4818] 5. *Weight-Size Rule*

A similar graph can be derived for other corresponding sizes of copper and aluminum wires. As a matter of fact, a curious empirical relationship is observed if one compares the American Wire Gage number sizes with the approximate per unit length weights of bare aluminum and copper cables. This is, that an aluminum cable weighs about the same (always somewhat less) as a copper wire five number sizes smaller, as shown in the following tabulation:

Table 1

## Aluminum and Copper Conductor Sizes of Equivalent Weight

Copper		Aluminum	
Wire Size A.W.G.	Weight—lbs per 1,000 ft.	Wire Size A.W.G.	Weight—lbs per 1,000 ft.
2	202.9	4/0	198.6
3	162.5	3/0	157.5
4	128.9	2/0	124.9
5	102.2	1/0	98.1
6	81.0	1	78.5
7	64.3	2	62.3
8	50.1	3	49.4
9	40.4	4	39.2
11	24.9	6	24.6
13	15.7	8	15.2
15	9.8	10	9.5

[fol. 4819] This relationship arises because of the method of derivation of American wire Gage sizes whereby there is the same geometric ratio between the areas of any two adjacent wire sizes. This ratio works out to 1.261, which raised to the fifth power is 3.20 or very nearly the ratio of the densities of copper and electrical grade aluminum which is 3.32.

6. *Conductivity-Size Rule*

This geometric relationship of the American Standard Wire Gage sizes gives rise to another convenient rule relating the corresponding conductivities and current capacities of aluminum and copper wires. The area relationship of wires two gage numbers apart is 1.261 squared or 1.59. Now this value is practically the same as the conductivity ratio of copper to aluminum based on the International Conductivity Standard, which is 99% to 62% or 1.60. Consequently, the rule is that aluminum wire has the same

conductivity as copper wire two sizes smaller. Since voltage drop for the smaller size cables in conduit is principally due to resistance (for No. 4/0 wire, resistance is .0534 ohms per 1,000 ft. and the resistance becomes comparatively greater as the wires become smaller), a practical rule is that an aluminum cable has the same voltage drop as a copper cable two wire sizes smaller. See table 8 for a tabulation of actual voltage-drop values.

### 7. Current Capacity—Size Rule

There is finally another approximate empirical rule, this one relating to rated current capacities. This rule is similar [fol. 4820] to the voltage drop rule. It states that an aluminum wire has a rated current capacity approximately the same as a copper wire two wire gage sizes smaller. This rule arises from the method of deriving wire sizes and the ability of wires to carry a given electric current.

Current carrying ability is limited by temperature rise rather than voltage drop. The temperature rise of the wire depends on the ability of the wire to dissipate the energy or heat loss caused by the flow of current within the wire. And this ability is practically a direct function of the peripheral area of the conductor and therefore of the diameter of the conductor. In Fig. 2 it can be seen that the allowable current carrying capacities recommended by the National Electric Code are nearly a linear function of the conductor diameter.

For an insulated aluminum and copper wire of the same diameter, the temperature rise and therefore the energy dissipation of their respective rated currents will be the same.

$$I_{Al} R_{Al} = I_{Cu} R_{Cu}$$

If the conductivities of these wires are taken as 61% and 99% respectively, then

$$I_{Al} = \frac{61}{99} I_{Cu}$$

$$I_{Al} = \frac{I_{Cu}}{1.27} = .79 I_{Cu}$$



[fol. 4821]

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Calculated By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): ☐ Dtg. Rm. ☐ General File ☐ Estimate File ☐ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

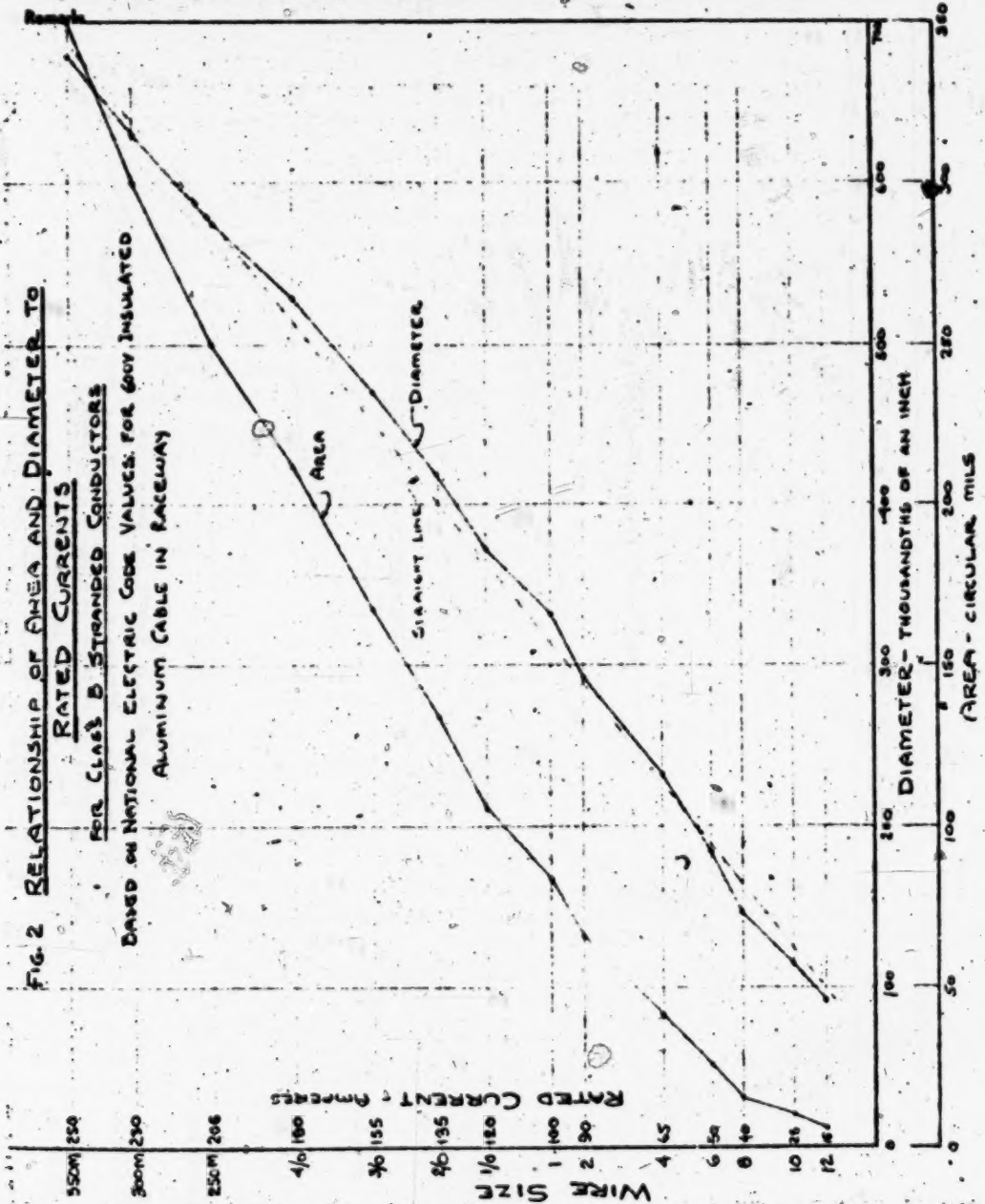
FIG. 2 RELATIONSHIP OF AREA AND DIAMETER TO

RATED CURRENTS

FOR CLASS B STRANDED CONDUCTORS

BASED ON NATIONAL ELECTRIC CODE VALUES FOR 60V INSULATED

ALUMINUM CABLE IN RACEWAY



[fol. 4822] Thus, from a consideration of conductivities and heat energy generation alone, we note that an aluminum conductor has about 79% the current carrying capacity of a copper conductor of the same size. Actually, this value of 79% is a minimum value for use in 60 cycle power circuits and is true for the smaller sizes of insulated cable. It is found that for the larger cables skin effect is more pronounced for copper because of its greater conductivity. E. E. McIlveen has determined experimental values of A.C./D.C. ratios of 1.13 for aluminum and 1.23 for copper in tests on 1,500,000 CM cables in iron conduit.<sup>(3)</sup> However, the difference is considerably less for the smaller sizes of cables and practically negligible for those in the American Wire Gage range. Actually, the National Electric Code allowable current-carrying capacities tend to be above 79% for the larger cables (250 MCM and above) and below this value for the smaller sizes in type RH insulated conductors. These ratios are shown on Fig. 3.

Now, the American Wire Gage sizes are so devised that any wire diameter is 89% the diameter of the next larger one. Therefore, a wire two sizes smaller will have a diameter about 79% of the larger wire diameter. Since the current carrying ability of aluminum wires is about 79% that of copper, then an aluminum wire should have the same current carrying capacity as a copper wire two A.W.G. sizes smaller. This relationship is closely reflected by the allowable current carrying capacities of aluminum and copper conductors of the latest edition (1956) of the [fol. 4823] National Electric Code.

These are compared below for conductors with type RH insulation:

Table 2

Copper		Aluminum	
A.W.G. Size	Rated Capacity	A.W.G. Size	Rated Capacity
14	15	12	15
12	20	10	25
10	30	8	40
8	45	6	50
6	65	4	65
4	85	2	90
		1	100
2	115	1/0	120
1	130	2/0	135
1/0	150	3/0	155
2/0	175	4/0	180
3/0	200	250 MCM	205
4/0	230	300 MCM	230
250 MCM	255	350 MCM	250
350 MCM	310	500 MCM	310
500 MCM	380	750 MCM	385

[fol. 4824] Comparative ampere load ranges are shown graphically contrasted in Fig. 3.

Consequently we may postulate as a general design rule that an aluminum conductor will in all cases provide equivalent or better current carrying capacity and voltage drop than a copper wire two A.W.G. sizes smaller. However, it would be wrong to design an installation on this basis, that is, with the idea of replacing a pre-chosen copper conductor. Aluminum should not be treated merely as a substitute for copper conductors, but rather as a valuable electrical component on whose properties electrical design should be based directly.

Thus, for a 35 ampere load, we would select a No. 8 copper wire or a No. 8 aluminum wire, *not* a #6 aluminum wire which the previous table indicates to be the approximate equivalent of No. 8 copper wire.

### 8. Load-Price Comparison

All the foregoing discussion of copper and aluminum conductor equivalents are of considerable academic interest and serve to vividly illustrate comparative electrical and physical properties. However, for the practical design engineer, presented with two alternatives of equivalent technical merit, the question is simply one of economics. How much does each installation cost? Or, in the case of

electrical conductors, what are the costs to carry a given load by copper conductors on the other?

[fol. 4825] Fig. 4 presents an answer to this question in the form of a direct list price (June, 1956) comparison of copper and aluminum conductors with type RH insulation to carry a given electrical load. Voltage drop has not been considered. In general, it will be the same for either copper or aluminum conductors, as previously explained and as shown in Table 3. No other costs have been considered. Handling costs should be about the same or favor aluminum because of its lighter weight. Splicing costs will be higher for aluminum. Installation (pulling) costs will tend to be equal, since the lighter weight of aluminum will tend to cancel out the effect of its larger size. To a considerable extent, the cost of splicing, which is discussed later in this article, will depend on the skill and familiarity of labor with proper aluminum splicing procedures. All in all, lumped labor and overhead costs should not vary greatly and, consequently, their difference will not be an important factor in an economic comparison. For all practical purposes, the comparative list price cost of the cables will be the prime determining economic factor.

### 9. *Types of Cable Installations*

Since the cost of conductors alone is being considered, it is obvious that the conclusions drawn from Fig 4 will apply only to feeder installations which do not use metallic conduit. Such installations will include the following:

[fol. 4826]

SIZE MCM OR AWG	AMPERES	SIZE MCM OR AWG	PER CENT OF SAME SIZE COPPER CABLE
750	495	845	
600	420	1000	
500	385	750	84.1
400	335	600	84.9
350	315	500	84.6
300	285	400	86.6
250	255	350	79.4
4/0	230	300	86.7
3/0	205	250	84.9
2/0	175	4/0	78.3
1/0	155	3/0	77.5
1	135	2/0	77.1
2	115	1/0	80.0
4	90	1	78.0
6	75	2	76.2
8	65	4	76.6
10	55	6	77.0
12	45	8	88.9
	35	10	83.4
	25	12	75.0
	15		
	10		
	5		
	0		
COPPER		ALUMINUM	

FIG. 3

COMPARATIVE CHART  
1956 NATIONAL ELECTRIC CODE  
ALLOWABLE CURRENT-  
CARRYING CAPACITIES  
OF INSULATED CONDUCTORS  
TYPE RH INSULATION  
3 CONDUCTORS PER RACEWAY

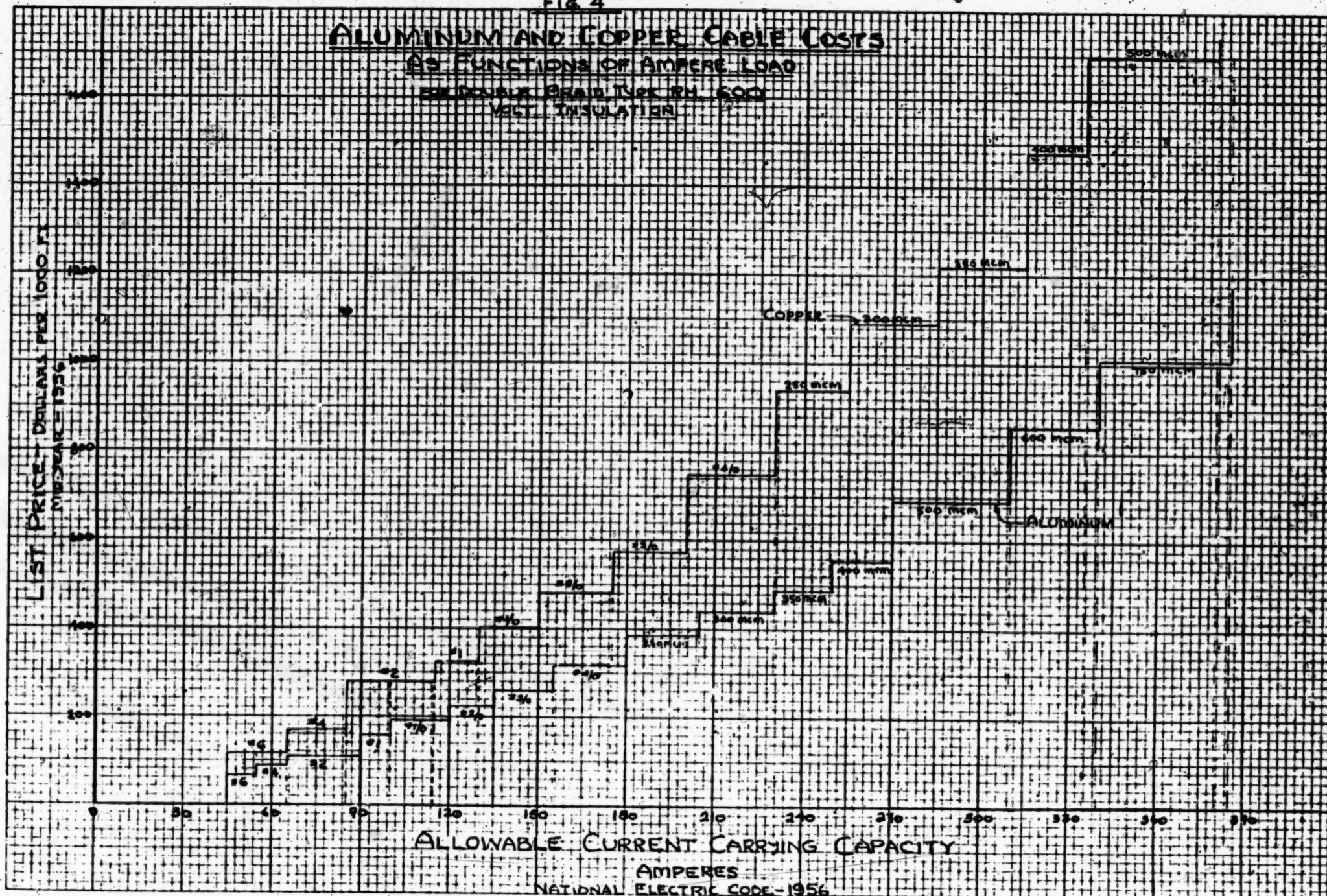


[fol. 4827]

Fig. 4

## ALUMINUM AND COPPER CABLE COSTS

AS FUNCTIONS OF AMPERE LOAD

RIGIDLY BRAID TYP. RM. 600  
VOLT INSULATION

(a) Open wiring. This would apply to wiring on insulators, cleats, pole lines and racks. The cost of larger holding and clamp devices required will tend to be canceled out by the lighter weight of aluminum which requires fewer or less rugged supports.

(b) Wiring in fiber conduit. Such conduit is relatively inexpensive and is generally used in large standard sizes, usually 4-inch, for a large range of cable sizes. In general, costs for a fiber duct installation (less the cables) particularly if concrete-encased, would be about the same for either copper or aluminum cables.

#### 10. Cost Rates—Copper to Aluminum Cables

The Copper to Aluminum cable cost ratios as a function of a range of given loads is shown tabulated below and plotted in Fig. 5.

Table 4

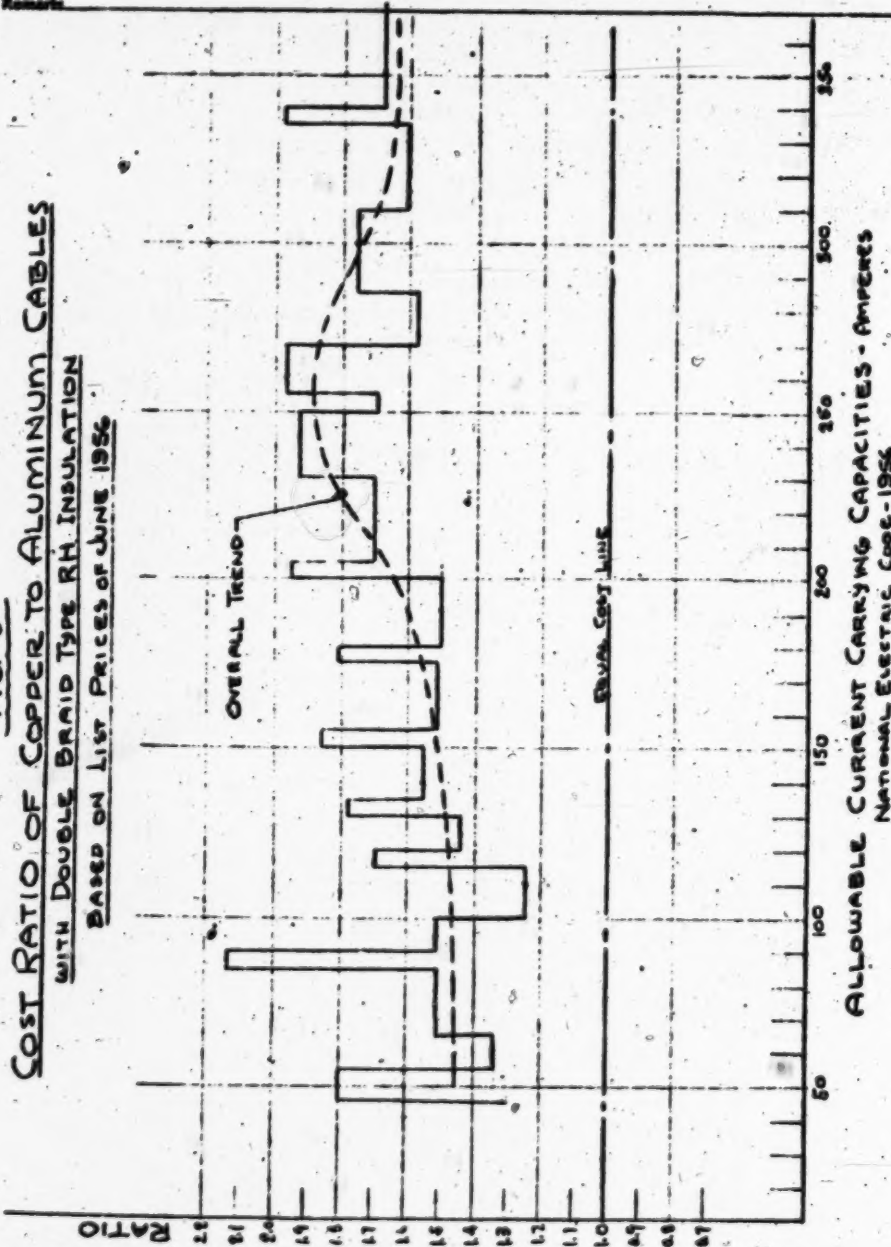
Ratio of Copper to Aluminum Cable List Price Costs Double Braid, Type RH,  
600-volt Insulation for Various Ampere Loads.  
(Based on National Electric Code—1956)  
Mid-year 1956 Prices

Load Range In Amperes	Size of Cable		Cost Ratio
	Copper	Aluminum	
45- 50.....	No. 6 A.W.G.	No. 6 A.W.G.	1.80
50- 65.....	6	4	1.34
65- 85.....	4	2	1.51
85- 90.....	2	2	2.13
90-100.....	2	1	1.51

[fol. 4829]

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Cables By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): Dftg. Rm. \_\_\_\_\_ General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

**FIG. 5**  
**COST RATIO OF COPPER TO ALUMINUM CABLES**  
**WITH DOUBLE BRAID TYPE RH INSULATION**  
**BASED ON LIST PRICES OF JUNE 1956**



[Vol. 4830]

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Cals By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): Dtg Rm. \_\_\_\_\_ General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

TABLE 3

VOLTAGE DROP OF ALUMINUM & COPPER CONDUCTORS FOR EQUIVALENT ELECTRICAL LOADS 3 SINGLE CONDUCTORS IN STEEL CONDUIT, 80% R.P.					
LOAD RANGE AMPERES	CABLE SIZE AWG OR MCM		PHASE TO PHASE VOLTAGE DROP		
	COPPER	ALUM.	COPPER	ALUM.	RATIO AL TO CU
40-45	8	6	12.7	12.6	1.0
45-50	6	6	7.9	12.6	1.6
50-65	6	4	7.9	7.9	1.0
65-85	4	2	5.1	5.1	1.0
85-90	2	2	3.4	5.1	1.5
90-100	2	1	3.4	3.9	1.15
100-115	2	1/0	3.4	3.4	1.0
115-120	1	1/0	2.8	3.4	1.2
120-130	1	3/0	2.8	2.8	1.0
130-135	1/0	3/0	2.3	2.8	1.2
135-150	1/0	3/0	2.3	2.3	1.0
150-155	3/0	3/0	1.9	2.3	1.2
155-175	3/0	4/0	1.9	1.9	1.0
175-180	3/0	4/0	1.6	1.9	1.2
180-200	3/0	250	1.6	1.7	1.0
200-205	4/0	250	1.4	1.7	1.2
205-230	4/0	300	1.4	1.5	1.1
230-250	250	350	1.26	1.3	1.0
250-255	250	400	1.26	1.24	1.0
255-270	300	400	1.13	1.24	1.1
270-285	300	500	1.13	1.08	0.95
285-310	350	500	1.04	1.08	1.0
310-335	400	600	0.97	0.98	1.0
335-340	500	600	0.88	0.98	1.1
340-380	500	750	0.88	0.89	1.0



[fol. 4831]

Load Range In Amperes	Size of Cable		Cost Ratio
	Copper	Aluminum	
100-115.....	2	1/0	1.24
115-120.....	1	1/0	1.69
120-130.....	1	2/0	1.44
130-135.....	1/0	2.0	1.78
135-150.....	1/0	3/0	1.55
150-155.....	2/0	3/0	1.86
155-165.....	2/0	4/0	1.51
165-180.....	3/0	4/0	1.81
180-200.....	3/0	250 MCM	1.50
200-205.....	4/0	250 MCM	1.95
205-230.....	4/0	300 MCM	1.70
230-250.....	250 MCM	350 MCM	1.93
250-255.....	250 MCM	400 MCM	1.69
255-270.....	300 MCM	400 MCM	1.97
270-285.....	300 MCM	500 MCM	1.58
285-310.....	350 MCM	500 MCM	1.76
310-335.....	400 MCM	600 MCM	1.61
335-340.....	500 MCM	600 MCM	1.98
340-380.....	500 MCM	750 MCM	1.68

[fol. 4832] From these data it can be seen that on a per ampere basis copper cable ranges generally from about 30% to 100% more expensive than aluminum cable. The irregularities in the curve are, of course, due to the necessary discontinuities in a range of wire sizes. However, a general trend can be noted. The economic advantage of aluminum appears to be a maximum in the range around 250 amperes and is less for smaller and larger loads, although larger loads in general appear to have higher cost ratios.

As might be expected, the price ratio curve is to a considerable extent a reflection of the weight ratio curve, which is shown plotted in Fig. 6. The favorable peak is not so marked for weight as for price, but it occurs at about the same range—in the area of 250 amperes. In general, copper cables with type RH insulation weigh about 40 to 80 per cent more than do aluminum cables of the same carrying capacities, the more favorable ratios being in the range of larger cables.

For a lighter insulation, such as type T (plastic) the ratio curve will approach more closely to the equal conductivity line. For heavier insulation, the reverse will occur.

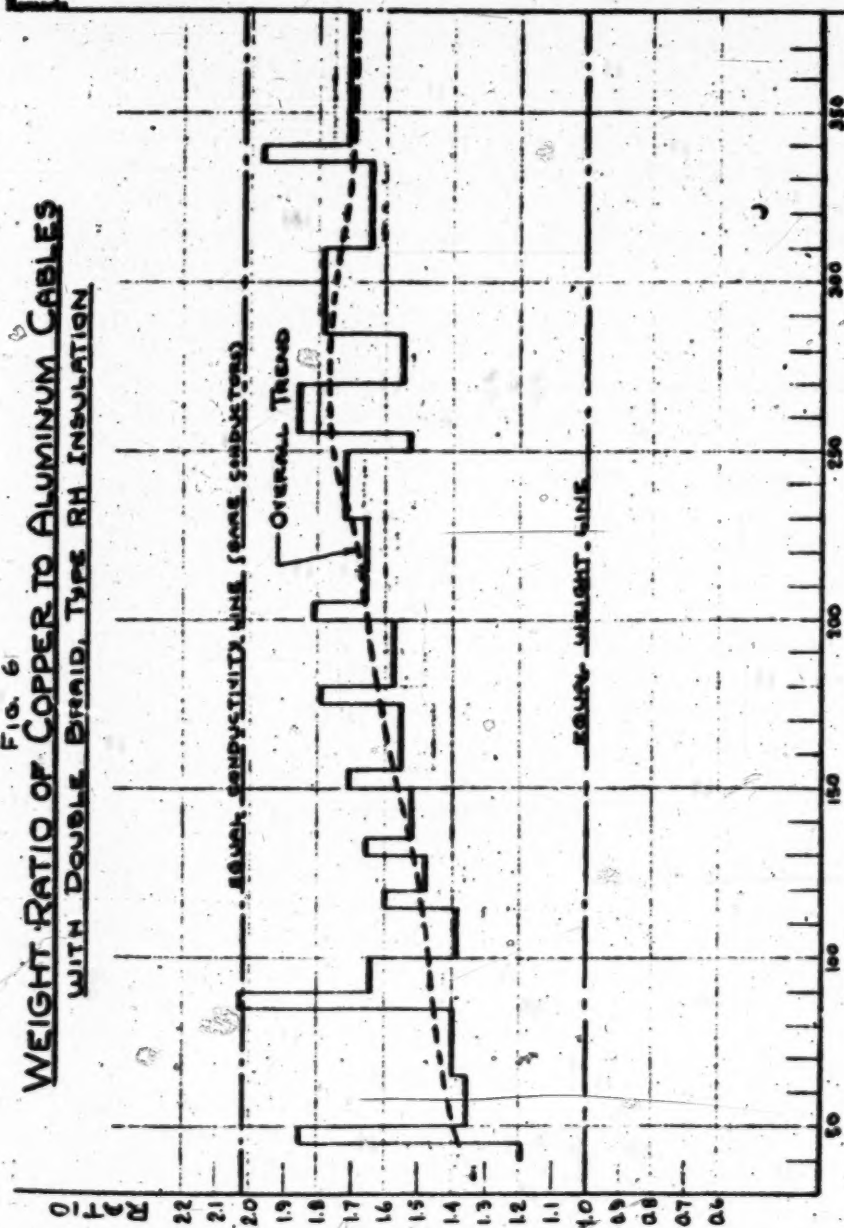
These price and weight tendencies are readily explained.



In the smallest sizes the favorable basic cost and weight of aluminum conductors are relatively small portions of the total cost and weight of the wires. In the largest sizes, there is a relatively greater circular mil per-ampere increase for aluminum than for copper, because the current

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Cable By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One) ☐ Dwg. ☐ General File ☐ Estimate File ☐ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

FIG. 6  
**WEIGHT RATIO OF COPPER TO ALUMINUM CABLES**  
**WITH DOUBLE BRAID, TYPE RH INSULATION**



**CURRENT-CARRYING CAPACITY - AMPERES**  
**NATIONAL ELECTRIC CODE - 1966**

[fol. 4834] capacity tends to increase directly as the cable diameter rather than the area and because of the greater increase of skin-effect in larger cables.

Figures 5 and 6 are for cables with 600-volt RH insulation and reflect a more favorable comparison than for cables with thicker insulations and more expensive protective coatings. However, significant savings will be realized with practically all types of cables (see section of this report on interlocked armor cable, for example) although the percentage savings will be lower for cables in which the cost of the basic conductor metal is a smaller part of the total cable cost.

### 11. *Overhead Distribution*

The economic advantage of aluminum as a cable conductor has only lately begun to affect the vast building construction field, but has been recognized for many years in overhead distribution lines where the use of aluminum cable is practically standard.

There are records of the use—aluminum conductors for transmission lines as long ago as the turn of the century on both East and West Coasts.<sup>(6)</sup> In the 1920's the use of steel reinforced aluminum cable for long span transmission lines began to be quite general and is now practically universal despite the fairly complicated double splices required by this cable.

[fol. 4835] The extended use of all-aluminum transmission cables, particularly in short span urban distribution, has become fairly standard with many utility companies during the past 10 years under the twin impacts of the copper shortage and the increasingly favorable economics of aluminum installations. Connector troubles have been largely solved, and connectors and connecting techniques continue to improve. A large proportion of the all-aluminum cables in this area are used for services.<sup>(8)</sup>

The economic advantage of bare all-aluminum cable over bare all-copper cable will, of course, be more marked than for insulated cable, wherein the larger aluminum cable is penalized by the cost of more insulation. In the distribution field comparative costs will tend to approach more closely equal carrying capacity costs. Another large savings at-

tributable to the lighter weight of aluminum conductors results from the need of fewer or less sturdy supporting towers and pole structures.

## 12. *Conduit Requirements*

In office and industrial buildings the usual cable installation is in conduit. Since for equivalent loads, aluminum cables will in most cases require conduit one size larger than a copper cable installation, the combined cost of cables and conduits must be considered in any comparative economic analysis.

Fig. 7 is a comparative chart showing conduit sizes required for copper and aluminum cables with type RH insulation for three and four conductors per conduit for loads from zero to values in the 300 and 400

AMPERES

**3 CONDUCTORS PER CONDUIT**

475	4" 445
3 1/2"	4"
380	3 1/2"
3"	3 1/2"
310	3"
285	3"
2 1/2"	3"
230	2 1/2"
200	2"
155	2"
130	1 1/2"
115	1 1/2"
100	1 1/4"
90	1 1/4"
80	1"
65	1"
45	3/4"
40	3/4"
30	3/4"
25	3/4"
20	3/4"
15	3/4"
10	3/4"
5	3/4"
3	3/4"
2	3/4"
1	3/4"
0.5	3/4"
0.25	3/4"
0.125	3/4"
0.0625	3/4"
0.03125	3/4"
0.015625	3/4"
0.0078125	3/4"
0.00390625	3/4"
0.001953125	3/4"
0.0009765625	3/4"
0.00048828125	3/4"
0.000244140625	3/4"
0.0001220703125	3/4"
0.00006103515625	3/4"
0.000030517578125	3/4"
0.0000152587890625	3/4"
0.00000762939453125	3/4"
0.000003814697265625	3/4"
0.0000019073486328125	3/4"
0.00000095367431640625	3/4"
0.000000476837158203125	3/4"
0.0000002384185791015625	3/4"
0.00000011920928955078125	3/4"
0.000000059604644775390625	3/4"
0.0000000298023223876953125	3/4"
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0.0000000000000000000000000000000000003761581922631405472428760466070312500001405163841249631093750000150572732080390625000141002603329750000132633615653015625	3/4"
0.0000000000000000000000000000000000001880790961315702736214380233035156250000070258192062481546875000007528636604019531250000705013016648750000663168078265078125	3/4"
0.0000000000000000000000000000000000000940395480657851368107219011652578125000003512909603124807734375000037643183020097656250003525065083243750003265840391325390625	3/4"
0.0000000000000000000000000000000000000470197740328925684053609505826289062500001756454801562403867187500018821591510048828125001762532546611906250016329201956626953125	3/4"
0.000000000000	



[fol. 4837] ampere range. The cross-hatched areas mark those load ranges within which no change of conduit size is required when using either aluminum or copper conductors. From an inspection and analysis of the two graphs the following pertinent facts and relationships emerge:

(a) In the greater portion of the load range, the use of aluminum conduit will require the next larger conduit size.

(b) However, in certain load ranges, the same conduits may be used for either aluminum or copper conductors. In the range from zero to 380 amperes (allowable carrying capacity for 500 MCM copper cable) these ranges are a considerable fraction of the total.

(b-1) 3 conductors per conduit: 140 amperes or 37%

(b-2) 4 conductors per conduit: 135 amperes or 36%

(c) In the shaded areas the use of aluminum wires and cables should be most advantageous, since they are not penalized by the additional costs of larger conduits.

(d) The favorable areas appear to be more concentrated in the lower portion of the total load range. In the zero to 50 ampere ranges, the following load percentages will be able to use the same size conduits with either aluminum or copper wires:

(d-1) 3 conductors per conduit: 90%

(d-2) 4 conductors per conduit: 80%

### 13. *Combined Cable and Conduit Costs*

Since the combined costs of cable and conduit must be compared when considering aluminum cables for the usual [fol. 4838] building installation, these costs have been determined for three type RH insulated conductors in conduit over the normal load range. The results for this type of feeder should be quite typical of the results which would be obtained for 4-conductor feeders and for other insulations, such as plastic and varnished cambric.

Table 5 on the following page compares material costs for power feeders over the 40-380 ampere range for aluminum and copper conductors based on January, 1957, prices. It should be noted that at this time (March, 1957) a 5 per cent decrease has occurred in the price of copper cables and a 3 per cent increase in the price of steel conduit. The

effect of these price changes will be to reduce the material cost ratio in favor of copper conductors by about 5 percentage points in the larger feeder sizes and progressively less for the others to about 2 or 3 percentage points for the smallest sizes. All in all, these changes will not alter appreciably the general trend, which is more clearly indicated by the plotted material cost curves of Fig. 8.

The tabulated and plotted data indicates that feeder costs show no consistently advantageous trend for either metal for loads of 200 amperes or less, although, even in this range, aluminum conductor feeders in most cases will cost less than the equivalent feeders with copper conductors. However, above the 200 ampere mark, aluminum conductor feeders in all cases are distinctly more economical by amounts ranging from 18

[Vol. 4839]

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Cables By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): Dtg Rm. \_\_\_\_\_ General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

TABLE 5

# ELECTRICAL LOAD EQUIVALENTS 3 SINGLE CONDUCTOR TYPE RH, 600V CABLES IN CONDUIT

JAN. 1957

LOAD RANGE AMPERES	CABLE & CONDUIT SIZE				WEIGHT			MATERIAL COST		
	CS		AS		POUNDS PER 100 FT.			DOLLARS PER 100 FT.		
	COPPER CABLE # OF MCM	STEEL COND. IN.	ALUMINUM CABLE # OF MCM	STEEL COND. IN.	CS*	AS**	RATIO CS/AS	CS	AS	RATIO CS/AS
40-45	8	3/4	6	1	135	175	0.75	42	51	0.82
45-50	6	1	6	1 1/4	194	175	1.11	64	51	1.25
50-55	6	1	4	1 1/4	194	231	0.84	64	68	0.94
55-65	4	1 1/4	2	1 1/4	262	245	1.07	88	75	1.17
65-80	2	1 1/4	2	1 1/4	289	245	1.18	107	75	1.43
80-100	2	1 1/4	1	1 1/2	289	309	0.94	107	98	1.09
100-115	2	1 1/4	1/2	2	289	405	0.71	107	123	0.87
115-120	1	1 1/2	1/2	2	362	405	0.89	150	123	1.22
120-130	1	1 1/2	3/8	2	362	417	0.87	150	134	1.12
130-135	1/2	2	3/8	2	471	417	1.13	176	134	1.31
135-150	1/2	2	3/8	2	471	432	1.09	176	154	1.14
150-155	3/8	2	3/8	2	501	432	1.16	198	154	1.28
155-175	3/8	2	4/8	2 1/2	501	641	0.78	198	199	0.99
175-180	3/8	2	4/8	2 1/2	548	641	0.85	235	199	1.18
180-200	3/8	2	250	2 1/2	548	665	0.82	235	220	1.07
200-205	4/8	2 1/2	250	2 1/2	777	665	1.17	311	220	1.41
205-230	4/8	2 1/2	300	2 1/2	777	686	1.13	311	238	1.31
230-250	250	2 1/2	350	3	830	870	0.95	367	283	1.30
250-255	250	2 1/2	400	3	830	888	0.93	367	305	1.20
255-270	300	2 1/2	400	3	884	888	1.00	420	305	1.38
270-285	300	2 1/2	500	3	884	926	0.95	420	348	1.21
285-310	350	3	500	3	1098	926	1.19	475	348	1.36
310-335	400	3	600	3 1/2	1149	1116	1.03	520	441	1.18
335-340	500	3	600	3 1/2	1251	1116	1.12	611	441	1.39
340-380	500	3	750	3 1/2	1251	1149	1.09	611	490	1.25

\* CS - COPPER CABLE, STEEL CONDUIT

\*\* AS - ALUMINUM CABLE, STEEL CONDUIT

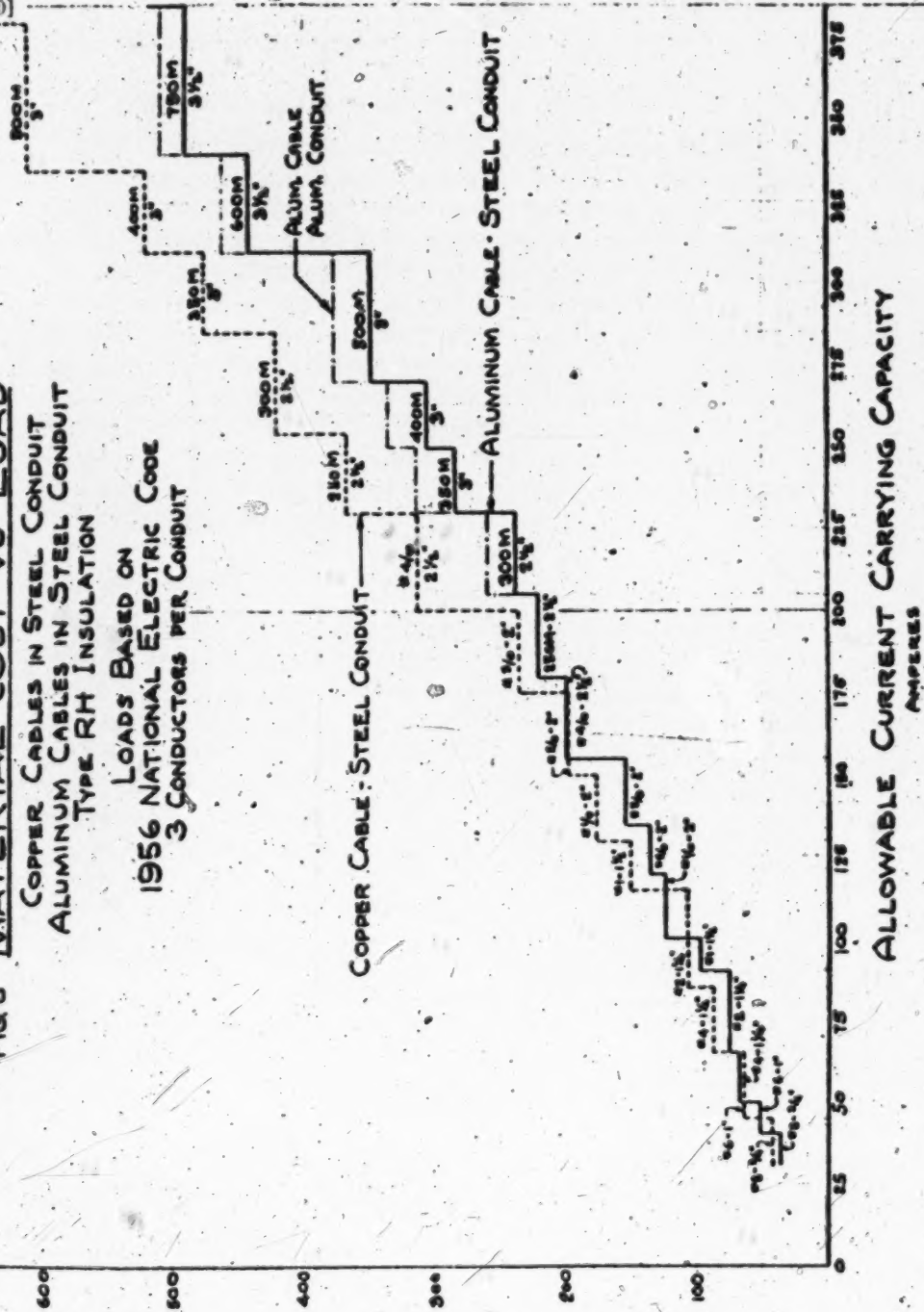
bl. 4840]

FIG. 8 MATERIAL COST VS LOAD

COPPER CABLES IN STEEL CONDUIT  
ALUMINUM CABLES IN STEEL CONDUIT  
TYPE RH INSULATION

LOADS BASED ON  
1956 NATIONAL ELECTRIC CODE  
3 CONDUCTORS PER CONDUIT

MATERIAL COST - DOLLARS PER 100 FT. - JAN 1957



[fol. 4841] to 39 per cent.

#### 14. *Aluminum Cables in Aluminum Conduits*

The same treatment was applied to aluminum cables in aluminum conduits in a comparative analysis with copper cables and steel conduit. The resulting data and ratios are shown tabulated in table 6. Here again a similar but less favorable trend is noted. Here also, the recent price changes will lower the material cost ratios in favor of copper conductors in steel conduit, but not as much, since the price of aluminum conduit has not changed. The material cost ratios for aluminum cables in aluminum conduits have been plotted on Fig. 8 in the favorable range for loads above 200 amperes. These ratios indicate total material costs 11 to 29 percent (7 to 25 per cent as adjusted) greater for copper cables in steel conduits.

#### 15. *Evaluating Labor Costs*

This favorable area has been isolated and expanded on Fig 9, and an attempt has been made to evaluate labor costs as well, so that the total cost picture may be obtained and a true evaluation of the total comparative economic picture determined. Only on the basis of total combined labor and material costs can an economic choice be made. Consequently such an evaluation has considerable practical value for the consulting engineer and electrical contractor.

#### 16. *Conduit Installation Cost*

The problem of evaluating labor costs is a difficult one and



{fol. 4842]

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Floor \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Color By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One): Dtg. Rm. \_\_\_\_\_ General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

TABLE 6

## ELECTRICAL LOAD EQUIVALENTS

3 SINGLE CONDUCTOR TYPE RH, 600V. CABLES IN CONDUIT

LOAD RANGE AMPERES	CABLE & CONDUIT SIZE				WEIGHT			MATERIAL COST		
	COPEL CABLE	STEEL COND.	ALUMINUM CABLE	COND.	POUNDS PER *CS	POUNDS PER *AA	RATIO CS TO AA	DOLLARS PER CS	DOLLARS PER AA	RATIO CS TO AA
40-45	8	3/4	6	1	131	73	1.75	42	57	0.74
45-50	6	1	6	1	194	75	2.59	64	57	1.12
50-55	6	1	4	1 1/4	194	100	1.94	64	78	0.82
65-85	4	1 1/4	2	1 1/4	262	113	2.32	88	85	1.03
85-90	2	1 1/4	2	1 1/4	289	113	2.56	107	85	1.26
90-100	2	1 1/4	1	1 1/2	289	146	1.98	107	110	0.97
100-115	2	1 1/4	1/2	2	289	187	1.55	107	139	0.77
115-120	1	1 1/2	1/2	2	362	187	1.94	150	139	1.08
120-130	1	1 1/2	1/2	2	362	199	1.82	150	149	1.01
130-135	1/2	2	1/2	2	471	199	2.37	176	149	1.18
135-150	1/2	2	1/2	2	471	214	2.20	176	160	1.10
150-155	1/2	2	1/2	2	501	214	2.34	198	160	1.24
155-175	1/2	2	1/2	2 1/2	501	296	1.69	198	220	0.90
175-180	1/2	2	1/2	2 1/2	548	296	1.85	235	220	1.07
180-200	1/2	2	1/2	2 1/2	548	320	1.71	235	241	0.94
200-205	1/2	2 1/2	250	2 1/2	777	320	2.43	311	241	1.29
205-230	1/2	2 1/2	300	2 1/2	777	341	2.28	311	259	1.20
230-250	250	2 1/2	350	3	830	419	1.98	367	312	1.17
250-255	250	2 1/2	400	3	830	437	1.90	367	334	1.10
255-270	300	2 1/2	400	3	884	437	2.02	420	334	1.26
270-285	300	2 1/2	500	3	884	475	1.84	420	377	1.11
285-310	350	3	500	3	1098	475	2.31	475	377	1.26
310-335	400	3	600	3 1/2	1149	573	2.00	520	461	1.13
335-340	500	3	600	3 1/2	1251	573	2.18	611	461	1.32
340-380	500	3	750	3 1/2	1251	606	2.06	611	509	1.20

\*CS - COPPER CABLE, STEEL COND. AA - ALUM. CABLE, ALUM. COND.

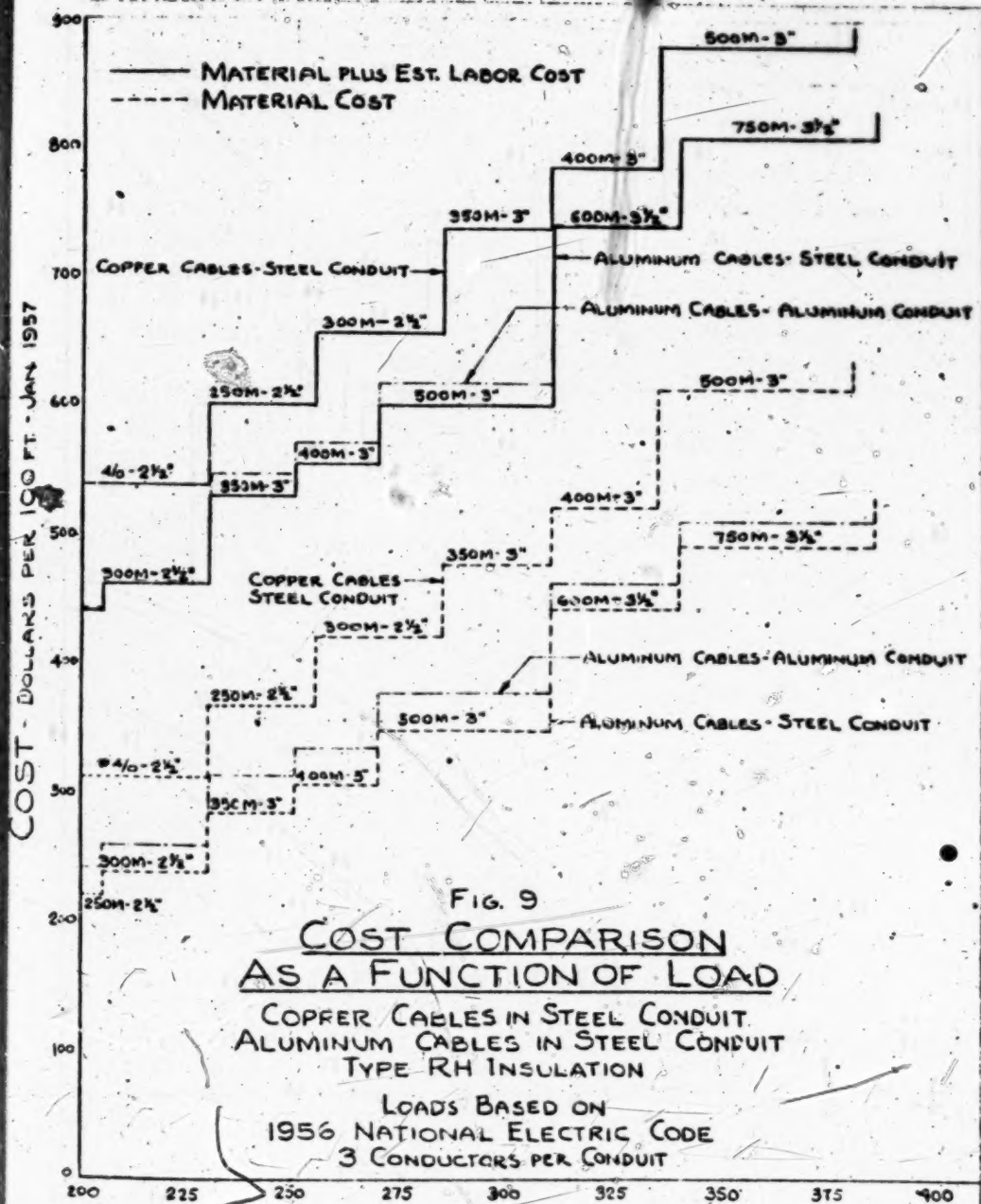


FIG. 9 - ALLOWABLE CURRENT CAPACITY  
AMPERES

[fol. 4844] highly subjective, although it is the crux of a successful contractor's operations. In Section No. 1 of this report on "Conduit" the matter of comparative conduit costs has been discussed and the labor costs quoted by a reputable and experienced electrical contractor have been used to obtain total comparative costs of aluminum and steel conduit costs. The same labor costs have been utilized in this analysis as well.

### 17. Cable Installation Costs

Cable installation costs are even more involved and subjective than conduit costs, since, along with varying working conditions, there are additional variables such as different cable-pulling lengths and varying numbers of cables per pull. To attempt to obtain an average for the almost infinite number and variety of pulling situations would hardly be possible or worthwhile. Various sources and authorities<sup>(9,10)</sup> have developed labor cost data and curves on this subject. These, however, must be applied with great care to any particular set of circumstances. Estimates on a cost per foot basis obtained from a number of contractors show considerable variation among themselves and with published data. Yet, such is the diversity of conditions that all of them could be right.

Consequently, it was decided that the most sensible course was to obtain comparative costs for the installation of aluminum and copper cables under identical conditions from a single experienced and reliable contractor. These conditions were simply a straight pull of 3 conductors into [fol. 4845] 100 feet of conduit. Connection costs were not evaluated, since with modern connectors and techniques these costs should not be too different and would, in any event, have small effect on the overall costs.

For pulling aluminum and copper cables of the same size, quoted labor costs were 6 to 15 per cent greater for copper cables ranging from No. 4 to 750 MCM sizes with the larger savings in the larger sizes. It is believed that this is a conservative estimate. Other contractors with aluminum cable experience have indicated greater relative savings. Further investigation is required in this area to obtain more reliable and accurate comparative labor cost data.

With relatively small labor cost differentials for the same sizes, cable pulling costs per ampere turn out to be generally higher for aluminum for some sizes and lower for others. The following is a partial tabulation of relative pulling costs for equivalent capacity cables:

Cable Size		Pulling Cost	
Copper	Aluminum	Copper	Aluminum
250 MCM	350 MCM	1.00	0.95
300 MCM	400 MCM	1.00	0.94
350 MCM	500 MCM	1.00	0.925
400 MCM	600 MCM	1.00	1.02
500 MCM	750 MCM	1.00	1.13

[fol. 4846] This particular contractor considers it 13 per cent more expensive to install 750 MCM aluminum cable as compared to 500 MCM copper cable. Another contractor who was queried indicated that the cost would be about the same in view of the considerably lighter weight of the aluminum conductors. On Fig. 6 it can be seen that the copper cables weight 71 percent more.

#### 18. Overall Material and Labor Costs

At any rate, considering it better to err on the conservative side, these labor cost figures were added to the material cost prices and the total cost indices were obtained for copper cables in steel conduit, aluminum cables in steel conduit, and aluminum cables in aluminum conduit. These values are tabulated in table 7 under the respective column headings CS, AS, and AA. The total costs for each of these three alternatives have been plotted on the upper portion of Fig. 9

These curves indicate that the inclusion of labor costs will in most cases cut the economic margin favoring an aluminum cable installation, except for those load ranges where larger conduit is not required to house the aluminum cables. Within these ranges the total overall savings for aluminum will increase, although the overall savings percentage will decrease.

#### 19. Aluminum Conduit Economies

Another interesting observation is that the use of aluminum conduit adds little or nothing to the overall cost. As a matter of fact for the



[fol. 4847]

Job Title \_\_\_\_\_ Job No. \_\_\_\_\_ Date \_\_\_\_\_  
 Trade \_\_\_\_\_ Cable By \_\_\_\_\_ Sheet No. \_\_\_\_\_ of \_\_\_\_\_  
 File (Check One) City Est. \_\_\_\_\_ General File \_\_\_\_\_ Estimate File \_\_\_\_\_ Other \_\_\_\_\_  
 Remarks \_\_\_\_\_

**COMPARATIVE COSTS - JAN 1957**  
**ELECTRICAL LOAD EQUIVALENTS**  
**THREE SINGLE CONDUCTOR TYPE RH CABLES IN CONDUIT**

LOAD RANGE AMPERES	CABLE & CONDUIT SIZE				RELATIVE MATERIAL COST			RELATIVE LABOR COST			RELATIVE MATERIAL PLUS LABOR COST		
	COPPER CABLE DIA. IN.	ALUM. CABLE DIA. IN.	CONDUIT DIA. IN.	CONDUIT IN.	CS	AS	AA	CS	AS	AA	CS	AS	AA
200-205	4/0	2 1/2	250	2 1/2	1.00	0.71	0.77	1.00	0.97	0.88	1.00	0.82	0.82
205-230	4/0	2 1/2	300	2 1/2	1.00	0.77	0.83	1.00	0.98	0.90	1.00	0.86	0.86
230-250	250	2 1/2	350	3	1.00	0.77	0.88	1.00	1.06	1.00	1.00	0.88	0.91
250-255	150	2 1/2	400	3	1.00	0.83	0.91	1.00	1.06	1.01	1.00	0.92	0.95
255-270	300	2 1/2	400	3	1.00	0.75	0.80	1.00	1.05	1.00	1.00	0.84	0.87
270-285	300	2 1/2	500	3	1.00	0.83	0.90	1.00	1.06	1.01	1.00	0.91	0.94
285-310	350	3	500	3	1.00	0.73	0.79	1.00	0.96	0.92	1.00	0.81	0.84
310-335	400	3	600	3 1/2	1.00	0.85	0.89	1.00	1.13	1.06	1.00	0.94	0.94
335-340	500	3	600	3 1/2	1.00	0.72	0.75	1.00	1.11	1.04	1.00	0.84	0.84
340-380	500	3	750	3 1/2	1.00	0.80	0.83	1.00	1.19	1.11	1.00	0.92	0.92

CS - COPPER CONDUCTORS, STEEL CONDUIT  
 AS - ALUMINUM CONDUCTORS, STEEL CONDUIT  
 AA - ALUMINUM CONDUCTORS, ALUMINUM CONDUIT



[fol. 4848] contractors who have indicated greater labor savings than those used in this analysis, the use of aluminum conduit in this favorable range should actually lower overall costs.

The savings realized by the use of aluminum conduit is not only in the direct labor required to handle and work on the conduit, but also in the labor and material savings resulting from the reduced support requirements. The latter economy would be especially significant for large horizontally or vertically supported conduit banks. The overall weight savings of an all-aluminum installation over a copper cable-steel conduit installation, or even an aluminum cable-steel conduit installation, is generally better than two to one as can be seen by the data in table 5. In table 4, it will be noted that no particular weight advantage is gained by using aluminum cables in steel conduit. The basic reason is that the weight of the conduit is the major portion of a cable-conduit installation, ranging from about 55 to 80 per cent of the total weight of the installation, even for copper cables.

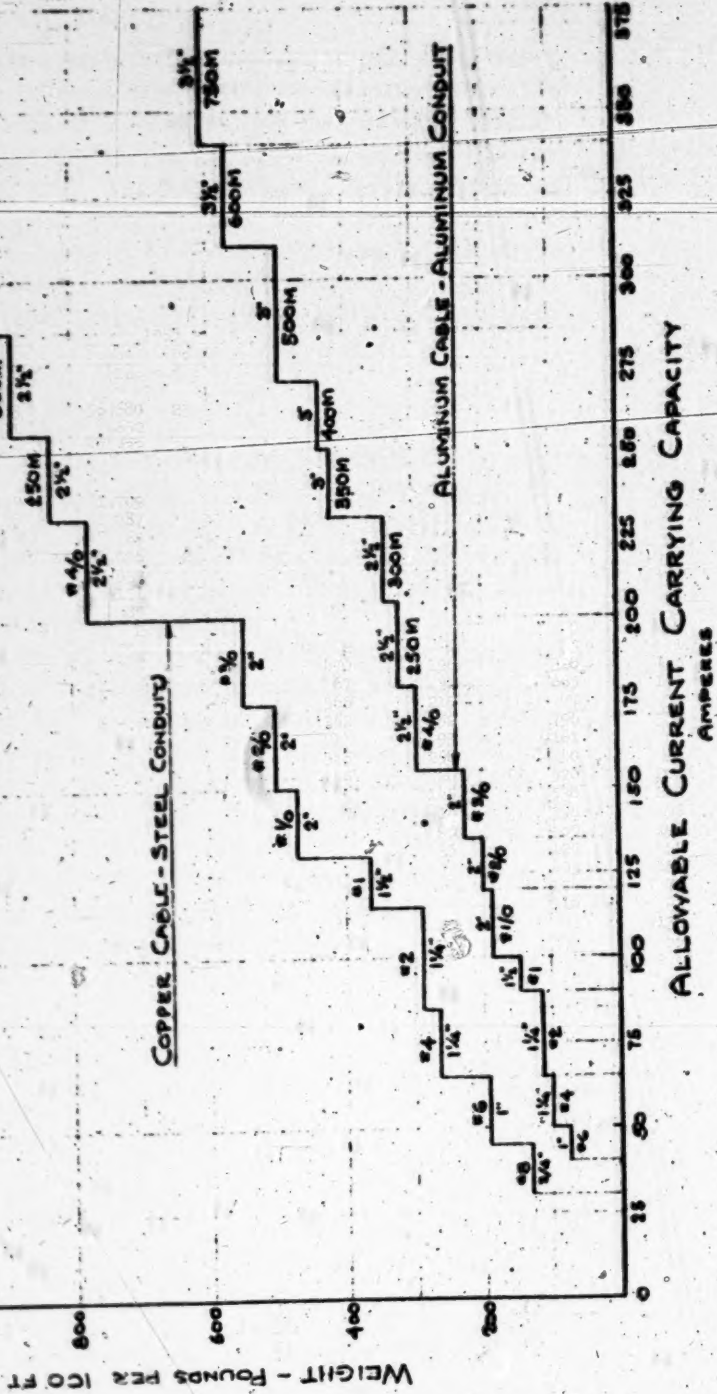
A more graphic picture of the comparative weight relationship is provided by Fig. 10, wherein overall weight for a 3-cable feeder is plotted as a function of load for all-aluminum and copper-steel cable and conduit installations. A similar curve for aluminum cables and steel conduit would generally follow the copper-steel curve.

For a more thorough discussion of estimated labor savings by the use of aluminum conduit, see Section No. 2 and 12 of this report.

FIG 10- FEEDER WEIGHT VS LOAD

COPPER CABLES IN STEEL CONDUIT  
ALUMINUM CABLES IN ALUMINUM CONDUIT  
TYPE RH INSULATION

LOADS BASED ON  
1956 NATIONAL ELECTRIC CODE  
3 CONDUCTORS PER CONDUIT



[fol. 4850] Relative material, labor and overall costs have been tabulated on table 6 for copper cables in steel conduits and aluminum cables in both steel and aluminum conduits, with all costs for the copper cable installation reduced to the reference index of 1.00. Again, it should be kept in mind that the recent copper price change will tend to raise the aluminum cable indices 2 to 4 points, but that there is strong reason to believe that greater labor cost economies are possible for both aluminum cables and aluminum conduits.

## 20. *Branch Circuit Wiring*

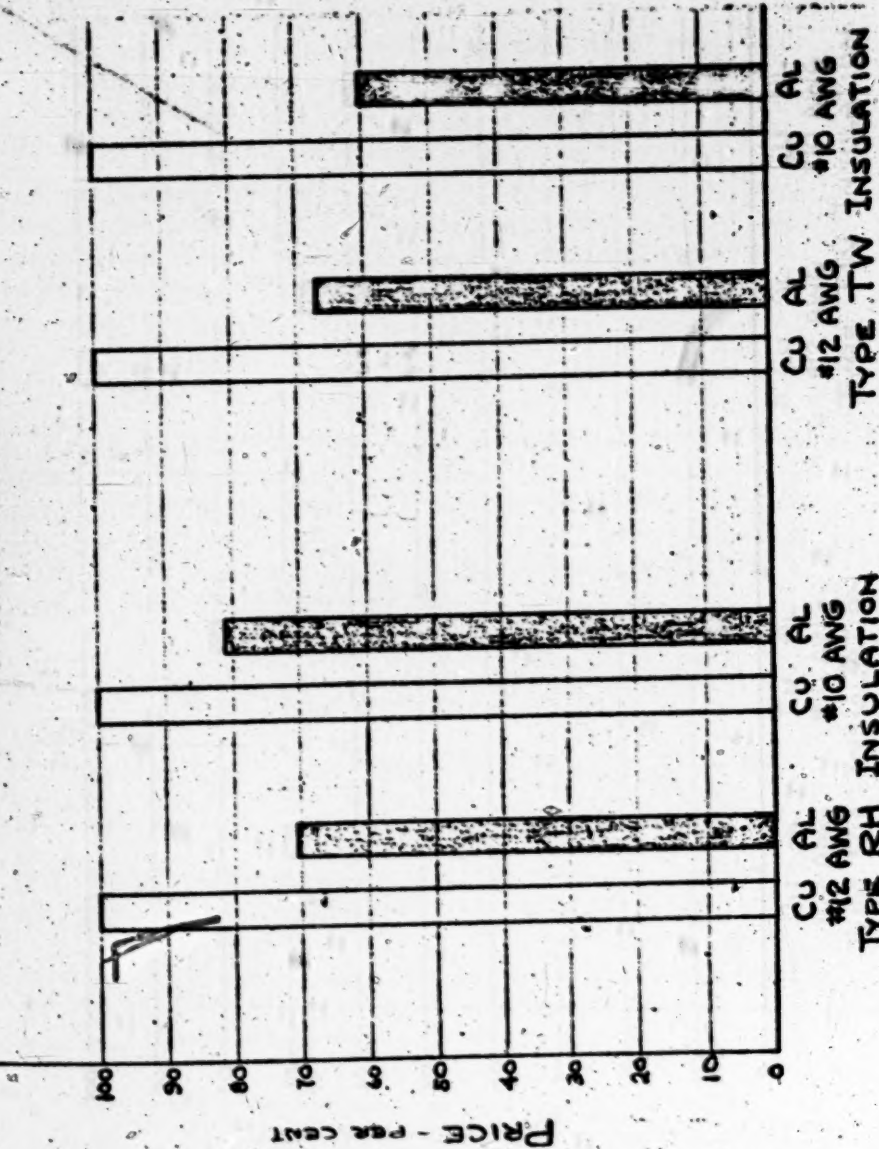
Electrical contractors and consulting engineers appear to believe almost dogmatically that aluminum is out of the question for the small size wires used for branch lighting and appliance circuits. This oddly fixed belief, amounting almost to unanimity, seems strange in view of the hard facts revealed in Figures 7 and 11.

In Fig. 7 we note that larger conduits are not required for 3-phase, 4-wire circuits using aluminum wires for loads up to 25 amperes. In Fig. 11 we see that at current prices, aluminum wires, size for size, in the common type RH and type TW insulations cost from about 60 to 80 per cent of their copper equivalents. Since for small loads under 15 amperes (the usual range for branch circuit wiring) an aluminum wire installation will not be penalized by larger wire or conduit requirements, this full price savings can be immediately applied to such an installation.

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Job No. \_\_\_\_\_ Date \_\_\_\_\_  
 Sub. \_\_\_\_\_ Cable By \_\_\_\_\_ Street No. \_\_\_\_\_ of \_\_\_\_\_  
 No. (Check One) City \_\_\_\_\_ State \_\_\_\_\_ District \_\_\_\_\_ Other \_\_\_\_\_  
 Remark \_\_\_\_\_

FIG. 11 - RELATIVE PRICES  
 OF ALUMINUM AND COPPER BRANCH CIRCUIT WIRES  
 MARCH 1957



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[fol. 4852] Consequently, a copper wire installation must justify itself by factors other than purchase cost. These factors are as follows:

- (a) Lower voltage drop.
- (b) Greater current capacity.
- (c) Easier splicing, resulting in lower labor coats and better connections.

## 21. Branch Circuit Voltage Drop.

Voltage-drop tables <sup>(11)</sup> indicate the following voltage drops per 1,000 amp-ft. for solid aluminum and copper wires, sizes 12 and 10 A.W.G. the size commonly employed in branch circuit wiring:

Wire Size	Copper	Aluminum
#12 A.W.G.	1.85	2.69
#10 A.W.G.	1.16	1.83

These are line-to-ground voltage drops and are for the multi-wire branch circuits consisting, in general, of 3 circuit wires with common neutral. If voltage drop be limited to a total of  $1\frac{1}{2}$  per cent from panel to fixture, the following table indicates the maximum lengths of multi-wire branch circuits for a 12-ampere load:

Table 8

Maximum Lengths of Multi-wire Branch Circuits to Limit Voltage Drop to  $1\frac{1}{2}$  per cent of Line Voltage

Aluminum Wires		Copper Wires	
120-V. Circuits	277-V. Circuit	120-V. Circuit	277-v. Ckt
#12 A.W.G. Wires 50'	115'	80'	185'
#10 A.W.G. Wires 80'	185'	130'	300'

[fol. 4853] Since probably over 90 per cent of branch circuit wires are size 12 A.W.G., the comparative properties of aluminum and copper wires in this size are of most importance. From table 7 we note that No. 12 aluminum wires are limited to 50 ft. by the load and voltage drop requirements as compared to 80 ft. for copper wire for 120 volt circuits. However, the permissible circuit length changes to 115 ft. for 277 volt circuits.

Ordinarily, branch circuits will not exceed the latter distance from their panel. Consequently, it is not expected that voltage drop will prove to be a limitation to the use of



aluminum # 12 A.W.G. wire for these higher voltage circuits, which are achieving ever wider use throughout this country, particularly in office and industrial buildings. Nowadays, practically all office buildings of any size utilize 277/480 volt distribution and lighting systems, as do most large industrial buildings. For these structures, aluminum branch circuit wiring should prove particularly applicable and economical.

## 22. *Current Capacity*

The 1956 National Electric Code sets the allowable current carrying capacity of aluminum wires with the common building types of insulation (code rubber, heat-resistant rubber and thermoplastic insulations) at 15 amperes. Previously, this allowable load was greater, and undoubtedly aluminum wire at its allowable 15 amperes will run cooler than will copper at its allowable 20 amperes, since the fully [fol. 4854] loaded aluminum wire will generate less heat energy.

To what extent is this load limitation detrimental? For some appliance branch circuits where a full 20-ampere capacity is desirable, the application of No. 12 A.W.G. aluminum wires will be definitely limited.

However, a properly designed appliance branch circuits should in practically all cases be able to use aluminum wires. Fifteen ampere circuits for appliances may be permitted twice the maximum voltage drop of lighting circuits without appreciably impairing their effectiveness. For larger loads, #10 A.W.G. aluminum wire with 25-ampere circuit breakers or fuses can be used. It should be noted that an important municipal code, such as the Electrical Code of the City of New York, limits appliance branch circuit protective devices to 25 amperes,<sup>(12)</sup> thus utilizing the full allowable current-carrying capacity of No. 10 A.W.G. aluminum wires for this application.

High-voltage (277-V.) lighting circuits, particularly in office buildings, will generally carry fewer amperes than 120-volt circuits. Actual loads are in practice limited by control requirements and code limitations on the maximum number of fluorescent lamp auxiliaries.<sup>(12)</sup> Consequently, fifteen ampere circuits are eminently suitable for this ap-

plication and #12 A.W.G. aluminum wires will generally operate well within their recommended voltage-drop and current-carrying limitations.

[fol. 4855] 23. *Branch Circuit Splicing*

Branch circuit splicing is the great "bete noire" of aluminum wire application in this field. Countless contractors and consulting engineers shudder at the very thought. Even the connector manufacturers, who have, most laudably, pioneered and developed connectors and lugs for the larger wire and cable sizes, appear for the most part to have kept away from a thorough investigation in this area. Actually, the present reality at this time is far different from the horrendous picture imagined by most contractors and engineers.

The original source of these fearful ideas lay in the admitted inadequacies of aluminum building wire in the early years of its development. In 1947 when aluminum branch wiring was installed in ALCOA's great rolling mill in Davenport, Iowa, there were considerable complaints from the electricians because of the brittleness of the hard drawn wire and its tendency to break off at the ends. When aluminum branch circuit wires were installed in the ALCOA building in Pittsburgh five years later, these complaints had largely vanished.

The reasons were two-fold—(1) The mechanical properties of the wires had been greatly improved so that greater flexibility was combined with adequate strength. (2) Greater pains and efforts were expended to teach the electricians the proper handling and splicing methods for small, as well as large, aluminum wires.

[fol. 4856] 24. *Bendability of Aluminum Wire*

Even today, considerable trouble will be encountered if one attempts to treat aluminum wire as if it were copper wire. Aluminum wire in the common commercial tempers is adequately flexible for end connections. It can be bent back and forth many times before breaking, as any one can ascertain. However, it will break long before standard annealed copper wire. This breakage appears to be aggravated by the tendency of aluminum to bend in a smaller

radius than copper. The sharper bending increases the stress concentration and leads to more rapid rupture.

## 25. "Notch Sensitivity"

Breaking will also be greatly hastened by notches or nicks on the stressed area. This so-called "notch effect" or "notch sensitivity" is a complex function of the mechanical properties of a material. It appears to derive from the combination of relative compressive, tensile and yield strengths. In general, rupture during bending is more likely to occur in materials with yield strengths close to their ultimate tensile strengths. In this respect standard annealed copper is supreme since it has no well-defined yield point, but yields gradually from about 6,000 psi to its ultimate strength of 32-34,000 psi attaining a total elongation before rupture of 40-60 per cent.<sup>(13)</sup>

Aluminum in the fully annealed state yields a total elongation of 23 per cent.<sup>(14)</sup> However, the elongation is considerably reduced as the hardness of the temper is increased until a minimum of 1.5-2.0 per cent is reached in the fully hard-drawn condition, where notch sensitivity is greatest.

In the three-quarter hard and intermediate tempers, which are commonly used for building wires, an effective compromise appears to have been reached between strength and end-breakage tendency.<sup>(1)</sup> However, the tendency is still there and the intelligent contractor and workman will exercise simple and effective handling and installation methods to minimize it. Experience and common sense recommendations are as follows:<sup>(15,16)</sup>

- (a) Heavy or sharp objects should never be thrown or piled on aluminum wire coils.
- (b) Insulation should be stripped off the ends by "paring-off" instead of "ringing" the wire. The latter method is much more liable to nick the conductor.
- (c) Wire ends should be twisted and bent as little and as few times as possible while making the splice.
- (d) Use round-nose pliers whenever bending the end of the bare wire into a loop or hook.

These simple precautions have eliminated the problem of end-breakage in recent aluminum wire installations.

[fol. 4858] 26. *Splicing Methods for Aluminum Branch Circuit Wires*

All the above precautions and operations are preliminary to the actual splicing of the wires. This has been and can be accomplished in a number of ways which include the following general methods:

(a) *Soldering.*<sup>(12)</sup> This can be readily done with modern solders and fluxes which eliminate the troublesome oxide film. However, the flux residue is corrosive and must be wiped away carefully. Also, the quality of the connection will depend to a great degree on the skill and conscientiousness of the electrician. As a result, this method is not generally used.

(b) *Welding.* This method has provided excellent pigtail connections. A battery-operated portable welder fuses the twisted wire ends into a solid connection within a carbon electrode cup.<sup>(13)</sup> An excellent electrical joint results, but this method, which was used in the early portion of the branch circuit wiring installation in the ALCOA building is somewhat inconvenient because of the heavy portable equipment, and the additional preparation required by the pigtails.

(c) *Compression Sleeves.* A close fitting sleeve, usually of aluminum is placed around the 2, 3 or 4 ends of the wires to be spliced together. Then a compression tool applies either an indent or circumferential squeeze which brings the wires together into a close, almost cold-welded union.

[fol. 4859] (d) *Bolted Connections.* This is generally a split-bolt connector of tin-plated copper alloy material. A spacer is often employed on tap-offs or two-wire splices.<sup>(17)</sup> It is the simplest and easiest to apply and is achieving wider use for both aluminum to aluminum and aluminum to copper splices.

For all the above splicing methods, indeed for all splicing, whether copper or aluminum is involved, the joined surfaces should first be thoroughly cleaned, generally by abrasive rubbing or scratch-brushing. In the case of the compression and bolted connections the persistent oxide



coating of the aluminum conductor must be scratch-removed through a coating of compound which will prevent oxide reformation on the abraded aluminum surface. This is most important, particularly for split-bolt connectors, and will usually spell the difference between a good and bad splice.

### *27. ALCOA Building Branch Circuit Wiring Installation*

The most notable example of an aluminum branch-circuit wiring installation in recent years is the ALCOA building in Pittsburgh, home office of the Aluminum Company of America. After initial use of the carbon-electric welding method, all small wire splices in junction and outlet boxes were made with common split-bolt connectors. This method has been fully justified by four years of service and is at present the splicing method used when system or maintenance changes are required.

[fol. 4860] The actual technique used by the electricians consists of paring-off the end insulation as described above, cleaning the wire ends with abrasive cloth dipped in ALCOA No. 2 joint compound, and then inserting the ends into the split bolt connector and tightening it. Practically, the only additional labor is the extra motion to dip the abrasive cloth into the joint compound.

Some additional observations are illuminating and will tend to dispel the almost mystic and fearful haze surrounding this subject. Although all branch circuit wiring is No. 12 A.W.G. aluminum, the fixture leads are copper, usually No. 16 A.W.G. These, however, are treated the same as the aluminum wires. The most common joint consists of 2 or 3 No. 12 aluminum wires and a copper fixture wire held together by a split bolt connector. No separators or spacers are used. Even more surprising, it was noted that the split bolt connectors were the bare copper alloy type recommended only for copper wire connections, rather than the tin-coated connector with spacer recommended for aluminum or mixed wire joints by the manufacturer.

When queried, the chief maintenance engineer indicated that this type of connection had proved itself in use and, consequently, he saw no sense in going to more expensive and cumbersome connections.

Why this is so may be readily deduced from a considera-



tion of the properties and behavior of aluminum wire in this particular environment. In the first place, the branch circuit wiring is generally lightly loaded and the entire [fol. 4861] building is air-conditioned, consequently, there are no large heat-cycling extremes to progressively destroy copper to aluminum connections. The splices are able to "breathe" readily within their elastic limits without causing plastic deformation of the aluminum wires. Secondly, corrosion between the two metals does not exist because the two necessary elements—moisture and electrolyte—are not present.

### 28. *Another Pigtail Splice*

Another way of making pigtail splices, used in the great Canadian Kitimat installation, is to apply individual indented symmetrical and asymmetrical aluminum terminal lugs to the ends of each wire and then bolt the group together.<sup>(19)</sup> A very compact joint is obtained, but the labor cost is considerably higher.

### 29. *Screw Terminal Connections*

A few words should be added about the connection of aluminum No. 12 and 14 A.W.G. wires to screw terminals. This can readily be done either by indenting an aluminum terminal lug to the end of the wire or by forming the end of the wire into a neat closed circular loop with the aid of round-nosed pliers.<sup>(19)</sup> In the both cases, scratch brushing under compound of the end connections precedes the actual screw-tightening of the wire end to the copper terminal, which is also scratch-brushed under compound.

### [fol. 4862] 30. *Cold-Pressure Butt Welding of Wires*

A very interesting method, recently developed, for joining solid electrical wires is by means of cold-pressure butt welding.<sup>(26,27,28,30)</sup> This technique is extremely versatile since it can be applied with equal facility not only to aluminum wires, but also to copper wires and to the joining of either metal to the other.

The union of the wires is effected by butt welding the two ends by the application of great pressure under carefully

controlled conditions. This operation is accomplished in less than half a minute in a specially designed tool which accurately cuts and squares the ends of the wires and then butts them together to effect a weld of the same cross-section as the wires being joined.

The resulting union is a true weld in the sense that a homogeneous crystalline structure results with physical qualities unimpaired. Indeed, an aluminum joint because of the cold work is stronger than the unaffected members on each side. Furthermore, so perfectly are the wires joined that the weld is scarcely visible once the easily removable weld flash is cut away. The joined section of wire may be flexed and twisted to a considerable degree without failure.

Presently available are light portable hand tools which are capable of welding aluminum wires in a wide range of sizes. Commercial A.W.G. sizes Nos. 18 to 8 may all be welded with a single tool equipped with cutter and interchangeable dies. Because of its early development and [fol. 4863] because the nature of the operation requires carefully machined dies and precise operation, this tool is still relatively expensive. However, the manufacturers expect to reduce the cost with further development and quantity production.

The possibility exists of developing relatively simple plyer-like tools for use on only a single size of wire of the more popular sizes. The most obvious would be No. 12 A.W.G. size, which in large commercial buildings will constitute about 95% of the total wire footage.

A deterrent to present use of this technique in general building wiring is that butt-welding can necessarily be applied to only two wires. For uniting three or more wires at a common joint a lap-weld must be used and this type of cold-pressure weld is not as satisfactory as butt-welding, because of the labor of scratch-brushing the individual wires and the danger of surface contamination which will produce a defective weld. Until an effective and inexpensive way is developed for making multiple wire joints, it is improbable that cold-pressure joining will make much headway in the electrical construction trade, even with aluminum wiring.

### 31. *Branch Circuit Wiring—Conclusions*

Thus, it is seen that the splicing of aluminum branch circuit wiring by a variety of techniques is readily learned and applied, and has been proved by many years' use in existing installations. It is doubtful if the use of aluminum branch [fol. 4864] circuit wiring should result in appreciably increased labor costs, if properly trained electricians are employed. Moreover, any small increase would tend to be reduced by the easier handling inherent in the lighter aluminum wire.

Consequently, there is reason to believe that appreciable savings, equal to the material cost difference of aluminum and copper No. 12 A.W.G. wires, can result from a properly executed aluminum branch circuit wiring installation.

A further look at the relative wire prices of Fig. 10 indicates possible material cost savings of 29 per cent for No. 12 A.W.G. type RH wire and 33 per cent for No. 12 A.W.G. type TW wire. As expected, thermoplastic insulated aluminum wire with its less expensive insulation shows a relatively greater saving. Somewhat surprising is the relatively high price of No. 10 A.W.G. type RH aluminum wire, which is 81 per cent of the copper wire price compared to about 60 per cent when thermoplastic insulation is used. This may be largely explained by the fact that No. 10 RH wire has 50 per cent greater insulation thickness than No. 12 RH wire (3/64 inch vs 2/64 inch) whereas Nos. 12 and 10 thermoplastic insulated wire have the same insulation thickness (2/64 inch).

### 32. *EC Aluminum*

Aluminum wire and building cables are drawn from almost pure aluminum, which is commercially designated as EC aluminum. Minimum percentage of aluminum is 99.45% [fol. 4865] and minimum electrical conductivity is 61% of the international annealed copper standard. At the present time, information from the Aluminum Company of America indicates that actual purity and conductivity are generally about 99.65% and 63% respectively.

In its annealed state EC aluminum is designated EC-0 and is remarkably ductile with low tensile strengths—about

4,000 psi yield strength and 12,000 psi ultimate strength. After a complete handdrawn wire-forming operation; the hardness and strength of the aluminum has greatly increased and its ductility has decreased. Ultimate tensile strength is about 27,000 psi and yield strength is about 24,000 psi. This fully hard-drawn state is designated EC-H19.

Since this temper is too brittle to be readily used for building wire applications, it is necessary to, partially anneal the wire in order to improve its handling ability, particularly its bendability, and to decrease its brittle breaking tendency.

Most aluminum building wire and cable is presently manufactured in the three-quarter hard temper, (EC-H26) or the intermediate temper (EC-H24). The former has a tensile strength ranging from 17,000 to 22,000 psi and the latter from 15,000 to 20,000 psi. Yield strengths run about 2,000 psi less than ultimate strengths.

### 33. *Aluminum Wire and Cable Pulling*

A recent poll of electrical contractors with aluminum cable experience indicated that well over half considered [fol. 4866] it unnecessary to take additional precautions when pulling aluminum cables because of their smaller tensile strength. (See Section 12 of this report). However, over one-third maintained that additional precautions were necessary.

The question arises, why this contradictory division of opinion? A consideration of the stress-strain curves of aluminum and copper provides an explanation. Fully annealed copper appears to reach its elastic limit at about 5,000 psi but can then stretch on and on (40-60%) to about 34,000 psi before rupturing.<sup>(12,3)</sup> Three-quarter hard aluminum departs from a linear stress-strain relationship at about 10-11,000 psi, but will yield after this point only a small fraction of the elongation of copper before rupturing at its ultimate strength of 17-22,000 psi.



### 34. *Recommended Pulling Stress*

Actually at the maximum recommended pulling stress for annealed copper wires, 10,000 psi, copper wire will have stretched about five times as far as aluminum wire, most of it inelastic deformation.<sup>(1)</sup> Consequently, the same allowable pulling stress appears to be satisfactory for aluminum wires and cables. As a matter of fact, at the huge Kitimat power plant and aluminum reduction installation of the Aluminum Company of Canada, an all-aluminum wire and cable installation, the maximum recommended pulling tensions were based on a stress of 10,000 psi.<sup>(19)</sup> Wire temper was three-quarter hard.

[fol. 4867] Thus, electrical contractors may safely stretch copper wires and cables well past their elastic limit, indeed; although it is inadvisable, they may even exceed considerably the recommended maximum pulling stress of 10,000 psi, without rupture. This latitude is absent in aluminum conductors. Contractors accustomed to the "give" in copper under excessive pulling stress will discover to their dismay that excessive over-stressing will rupture the aluminum conductor at a fraction of the stretch which copper can safely absorb.

The obvious solution is to pull aluminum cables without exceeding the recommended maximum stress, which is the same as that for copper cables. If this common limitation is observed, no additional pulling precautions need be taken, a fact confirmed by the majority of contractors with aluminum cable pulling experience.

### 35. *Aluminum Cable Joints—Non-technical Aspects*

The joining, splicing and connecting of aluminum cables is undoubtedly the most controversial and pivotal aspect of aluminum cable installations despite the fact that the problem of making swift, economical and reliable connections between aluminum cables and between aluminum and copper cables has been solved.

Since the purely technical difficulties have been solved, the only ones that remain are the human ones, and these are often far more formidable. The basic trouble is that aluminum cable connections are new and that they are different



[fol. 4868] from copper cable connections, which are entrenched with the familiarity of three-quarters of a century of electrical experience.

### 36. *Early Application*

Actually, aluminum cable connections are nearly as old as copper connections, but only on outside distribution lines. Long before ACSR cables became the virtual standard for transmission lines, all-aluminum cables were introduced and used successfully. The first known use of all-aluminum cable was in 1899,<sup>(30)</sup> and there are existing installations which date from shortly thereafter. Aluminum splices on these old lines and on the newer ones, through years of service, have proved their reliability, under electrical, corrosive and mechanical conditions which are generally far more extreme than any likely to be encountered in the usual office or industrial building. Consequently, it is, in reality, somewhat surprising that aluminum splices should be a significant deterrent to the increased use of insulated aluminum cables, or that it should seemingly be regarded by some contractors and engineers as a new and somewhat fearful problem.

### 37. *Factors in Attitude to Aluminum Cable Joints*

Some reasons for this situation can be pointed out. For one thing, many contractors who work on electrical building installations, never do transmission line work and consequently have been totally unacquainted with any kind of aluminum cable. This is especially true in large urban centers where the largest insulated cable installations occur. [fol. 4869] For another, while suitably engineered connections have been developed for aluminum transmission lines, such connections were until relatively recently not readily available for insulated aluminum building cables. As a matter of fact, the major development of insulated aluminum cable connectors has undoubtedly taken place in the past decade.

Finally, aluminum cable connections are in some respects different. They require some re-thinking by installers. They require, in general, different connectors and altered techniques. In short, aluminum cables cannot be joined as if

they were copper cables. They have different electrical, chemical and mechanical characteristics which require a properly designed connector and installing procedure.

### 38. *Good Electrical Connection—Requirements*

The basic definition of a good electrical connection is the same for aluminum and copper cables—a durable joint of 100 per cent or more conductivity.

The first requirement is an adequate area of good metal-to-metal contact. Many articles have been written pointing out that an aluminum cable joint requires a greater contact area than a copper cable joint. This requirement arises from the fact that an aluminum cable will have about 80 per cent of the current capacity of the same size copper cable, whereas its area conductivity is about 61 per cent of [fol. 4870] the copper cable. Consequently, to achieve the same relative conductivity an aluminum splice should have a contact area about one-third greater than the same size copper cable splice.

### 39. *Eliminating the Oxide Coating*

To achieve intimate contact of the joint members, the joint surfaces must be clean. In the case of aluminum the attainment of this condition is complicated by the tenaciousness and excellent insulation property of its oxide coating. This is the factor which introduces the major differences between aluminum cable and copper cable splices. Because the oxide coating reforms so rapidly, aluminum cable connections must be cleaned and made in the presence of an inhibiting grease or compound, whose principal function is to keep the oxygen of the air away from the newly uncoated metal surface and also to prevent gradual oxide reformation during the period of use.

Many suitable compounds are available. Some of the commoner ones are No-Ox-Id, Burndy Penetrox "A", ALCOA Joint Compound No. 2, or even ordinary vaseline. For all bolted and compression joints, it is advisable to first apply the compound and then thoroughly clean the cable ends with a soft wire brush through the compound, forcing it between the strands as much as possible.<sup>(2)</sup>

#### 40. *Union of Aluminum Cable Strands at Joints Required*

An additional problem now arises. This results from the combined effect of aluminum's persistent oxide coating and [fol. 4871] the stranded construction of practically all electrical cables No. 8 A.W.G. size and larger. Within a stranded aluminum cable, each individual strand acts in effect like a separate insulated wire. This is fine as long as no splice occurs, since internal losses and skin effect are reduced. However, at a joint or splice, it is necessary to break down this insulating coating on all strands and unite them as closely as possible into a homogeneous conducting medium. Otherwise, the surface conductors will tend to carry most of the current, and both joint and cable will be operating at decreased efficiency, higher temperature and greater power loss.<sup>(2,21)</sup>

A good electrical connection of aluminum cables must attain as closely as possible complete electrical union of all strands. The three principal types of joints, welded, bolted and compression types, if properly designed, and installed, will provide the desired joint characteristics.

#### 41. *Welded Connections*

Good welded joints provide the most efficient and reliable electrical connection. This is the only type of aluminum cable connection which does not require the use of compound, although the joint must be thoroughly cleaned. Generally this type of connection is confined to the joining of terminal connectors to cable ends. Helium-Arc electric welders are usually employed, the inert gas shielding the joint from oxidation so that a flux is not required. First the ends of the strands are welded together. Then the [fol. 4872] now solid end is welded to the body of the connector. Although the heat of the welding operation anneals a portion of the end of the cable, the reduction in strength is usually not important, particularly since the pulling operation has already occurred.

#### 42. *Compression Connections*

Compression joints permit a wide variety of connectors ranging from cable end-connectors to multi-branch splices. They are readily applicable to small as well as large cables. Connector bulk is relatively small and neat looking. The powerful equipment required is easily portable even for the largest size presses, which are capable of joining 2,000 MCM cables.<sup>(17)</sup>

This type of joint appears to break down interstrand resistance by a combination of crushing the strands and abrading-off their oxide coatings.<sup>(1)</sup> The use of compound prevents the oxide from reforming. The Burndy Engineering Company recommends the use of a zinc dust impregnated compound—their Penetrox "A"—with their compression joints. It is maintained that the zinc granules are forced between the strands and pierce the oxide to form conducting bridges.<sup>(22,17)</sup> The hollow bodies of the connectors are factory-filled with this compound and sealed, so that field application of the paste is not required.

The Thomas and Betts Company places reliance for obtaining a high conductivity joint completely on the crushing and abrading action of its compressive dies. These produce one or more hexagonal compressions or crimps on the body of the connector with such force that the cable strands and connector are squeezed into an almost homogeneous solid union. The Burndy compression connectors use either an indent-type or circular crimp. All of these connectors are in successful use in many aluminum cable installations.

Aluminum cable compression connectors generally are made of cast or tube aluminum, with the tube-type connectors coming into wider use today. Tin-plated copper alloy connectors are also available and are used successfully on either copper or aluminum cables. Recently, the Thomas and Betts Company have come out with a tin-coated tube-type aluminum connector which is Underwriters' Laboratories' approved for both copper and aluminum cables. This type of aluminum cable lug is cheaper than the tin-plated copper alloy lug, retains the advantage of not requiring surface scratch-brushing through compound for its bolted terminal connection and is basically more suitable



for aluminum cables, because it eliminates the long-run contact problems arising from cyclic differential expansion of two different metal bodies in intimate contact.

Aluminum body compression connectors appear to be an excellent solution to most of the aluminum building cable joining and splicing requirements. They are quite economical, although a considerable initial outlay is required for a range of presses and dies. They are easy to apply. No annealed weakening of the adjacent cable occurs, as in [fol. 4874] welding. They are quite versatile in their application, being available for cable-terminal lugs, butt splices for mixed cable sizes and mixed copper to aluminum joints, and for various combinations of take-off splices.

#### 43. Bolted Connectors

Bolted connectors are capable of an even wider variety of applications than compression connectors and are available in a bewildering variety of sizes and designs. Although they are used successfully on all types of aluminum cables, it is undoubtedly more difficult to obtain excellent electrical connections with this type of connector than with the compression type. One of the reasons is the complexity of the connector, which usually consists of at least two main bodies, one or more spacers and a number of bolts, nuts and washers. Another reason is the greater dependence necessarily placed on the electrician to properly apply the compound, scratch-clean the conductors and, secure the connector to the cables without omitting a spacer or neglecting to tighten a bolt. Consequently, the efficiency of bolted connections will be more variable than compression connections.

The advantages of bolted connections are that they can readily be taken apart without destroying the joint and that they do not require a large initial capital outlay for welding machines or compression devices and dies. A disadvantage is their greater bulk and weight.

[fol. 4875] Effective scratch brushing is undoubtedly more important for a bolted connector, since low initial contact resistance cannot be achieved by powerful crushing and abrasion, as is the case with compression connections. Over-all connection area will be larger to obtain the same effective



contact surface. Bolts should be tightened securely in order to crush the contacting surfaces as closely together as possible. It is not believed that the cold flow which will result from large applied pressures will be harmful, since surface contact will be maintained by the spring action of the bolts to a point where more or less stationary equilibrium will be reached between the forces in the bolts and the resisting stress in the aluminum cables. Certainly the cold flow tendency will be less than in compression connectors where it is not considered a problem.

#### 44. *Cold Flow*

*Cold flow* is another overworked term which has frightened many a prospective user of aluminum conductors. Sometimes the term "creep" is employed, although creep generally means the non-elastic strain of materials at elevated temperatures caused by stresses below the proportional limit. Creep rates even for the lower melting metals, such as aluminum, are extremely small at the usual joint temperatures and stresses.<sup>(23)</sup> As previously pointed out, connections will not work loose even under stresses beyond the yield point which cause large plastic deformation, since the stress will decrease to a point of equilibrium without [fol. 4876] the cable pulling away from the connector. Furthermore, a good connector usually has fine grooves or ridges on its inner surfaces to bite into the connector and prevent joint slippage upon any relaxation of pressure. Actually, the plastic flow property of aluminum is helpful in obtaining close, firm electrical contact.

#### 45. *Effect of Temperature Cycling*

The principal villain in the cases where the development of poor connections is ascribed to the plastic flow property of aluminum is usually a poorly designed connector, unsuitable for the environment in which it is applied. It will be found that the joint is unable to breathe properly under the cyclic temperature changes to which it is subjected. These temperature variations arise generally from the daily electrical load characteristic and are reinforced by the daily ambient temperature cycle.

The worst conditions will occur with an improperly de-

signed steel-bolted, copper-body connector under wide extremes of temperature cycling. As the temperature goes up, the copper tends to press harder against the aluminum cable, since aluminum has a temperature-expansion coefficient about 36 per cent greater than copper. The stress within the aluminum copper and steel increases. Relative movement occurs which depends on the relative expansion coefficients, the elastic moduli and the strength of the steel bolts. Finally, at a high enough temperature, the stress in the aluminum will exceed its yield point and it will tend to [fol. 4877] extrude out of the joint. Upon subsequent cooling to the original temperature, the deformed joint will exhibit decreased contact pressure and higher resistance. This chain of events will cause progressively increasing joint temperatures and resistance in succeeding cycles until complete joint failure occurs.

#### *46. Combatting Heat Cycling Joint Deterioration*

However, copper body connectors have been and are used with no trouble if properly designed and properly installed in environments which do not exceed their inherent abilities. This has been strikingly demonstrated previously in this section in the discussion of branch circuit wiring connections. A particular connector may be perfectly good on a normally loaded feeder within the relatively mild temperatures encountered in a modern structure and it may fail disastrously and quickly if used on extra heavy duty, wide-temperature cycle applications, such as underground feeder networks. The designer and installer must apply common sense to a sound knowledge of joint characteristics. And this is true for copper as well as aluminum joints.

There are various ways to combat heat cycling deterioration of joints. One way is to use larger connector bodies and decreased contact pressures. A better way is to design the connector so that all parts will "breathe" under stress and strain variations. It is important that the steel bolts should not be too large or they will not have enough spring action or "give" to permit elastic expansion of the aluminum and copper. The use of copper alloy bolts which have a larger spring constant (modulus of elasticity)

than steel and a larger temperature expansion coefficient will be a further help.

However, the best solution is the use of all-aluminum connectors, including aluminum bolts, for aluminum cable connections and also for aluminum-to-copper cable connections.<sup>(2,25)</sup> Good results have been attained with aluminum connectors using galvanized steel bolts.<sup>(22)</sup> The tendency nowadays, however, is to use the all-aluminum connector. Aluminum alloy bolts have strengths in the range of mild steel. The nuisance of thread seizing, a previous complaint, has been eliminated by hard-surfacing the threads with an Alumilite (heavy oxide) finish and dipping them in an anti-friction compound such as No-Ox-Id.

#### 47. *Galvanic Corrosion*

The use of all-aluminum bolted connectors not only effectively lays to rest the bogey of differential cyclic expansion, but also largely eliminates the danger of galvanic deterioration of the joint, even when copper and aluminum cables are joined. Galvanic or electrolytic corrosion of aluminum installations is another one of the fearful apprehensions which seem to haunt engineers and contractors with an intensity entirely disproportionate to the reality of the situation.

First of all, in the great majority of building installations galvanic corrosion, as well as chemical corrosion, will not even exist, since the necessary ingredient for galvanic corrosion, the simultaneous existence of moisture and electrolyte, will not be present in the joint environment. Secondly, if galvanic corrosion or the possibility of galvanic corrosion does occur, it can be easily and effectively combatted.

Galvanic corrosion occurs when metals of different electro-chemical potential form an electrolytic cell as part of a closed circuit. Under such conditions, the more anodic metal will deteriorate, its molecules being drawn into solution and then deposited as insoluble material in the joint and its vicinity. The farther apart in the electromotive series, the two metals are, the more intense will be the galvanic activity. Since copper and aluminum have over two

volts of d.c. potential between them, these two metals can easily form destructive electrolytic cells under the proper conditions. Since aluminum is anodic or less noble with respect to copper, aluminum will be the metal which undergoes progressive destruction of its material.

#### 48. *Preventing Galvanic Corrosion*

There are various ways to prevent galvanic corrosion of aluminum-copper joints or to minimize it in the presence of conditions (i.e. moisture and electrolyte) more or less permissive to it.<sup>(26,27)</sup> These include the following:

(a) Sealing or painting the joint with an inert material. Both materials should be coated. If not, then the cathodic rather than the anodic material. Coating the anodic material only is, in fact, dangerous, since a tiny flaw will immediately lead to accelerated galvanic activity at the [fol. 4880] exposed anode material, which will be all the more intense the smaller the fault.

(b) Plating of one of the joint materials or both with a metal midway in the electromotive series between the joined metals. The plating will act as a buffer and reduce the electrolytic cell voltage and therefore the galvanic deterioration of the anode.

(c) Isolation of the reacting metal surfaces, usually by rubber taping the joint, thereby lengthening the liquid electrolytic path and increasing its resistance.

(d) The use of relatively large anodic areas as compared to the cathode material. Galvanic current density at the anode may in this way be decreased greatly, with the result that corrosive deterioration will be reduced to a negligible hazard. Thus, it is not desirable to tap off small aluminum wires from large copper conductors, because the high current density at the relatively small anode (if electrolysis occurs) will rapidly destroy the joint.

(e) In an aluminum-copper cable joint, the aluminum conductor should always be placed above the copper conductor, if possible. This will tend to keep copper salts from draining on to the aluminum conductor and will thus reduce the effect of electrolytic corrosion on the aluminum conductor.



Today there is less of a tendency to be frightened by galvanic corrosion of aluminum, since more is known about it and more effective means of combatting it are available. [fol. 4881] The emphasis has shifted from the negative and sometimes irrelevant aspect of merely preventing galvanic corrosion to the positive and more fruitful attitude of maintaining proper joint conductivity, despite the presence or possibility of galvanic corrosion.

This philosophy has resulted in the recent development and introduction of all-aluminum bolted connectors of relatively massive proportions for aluminum-to-copper, as well as aluminum-to-aluminum joints. Reduction of electrolytic deterioration to a negligible proportion is accomplished in three ways, (1) by maintaining relatively wide separation between the copper and aluminum cables, (2) by presenting a relatively large anode surface, thereby greatly reducing electrolytic current density at the anode, (3) by the large aluminum connector, acting as a sacrificial material in lieu of the aluminum conductor.

#### 49. *Certain Disadvantages of Aluminum Cables*

It has already been pointed out that the use of aluminum building wire and cable must overcome certain handicaps, such as generally increased conduit sizes for an appreciable range of loads and different joining methods which require somewhat more care and effort than all-copper splices. These have been discussed and to some extent evaluated. In addition, there are some other considerations which should be recognized by the designer and contractor in order to eliminate or minimize the disadvantages resulting therefrom.

#### [fol. 4882] 50. *Educating Electricians*

One of these is the fact that relatively few electrical journeymen are acquainted with aluminum cable handling and splicing. In most cases, it will probably be advantageous and economical to brief the workmen beforehand on proper methods. Experience has shown that the installation and splicing techniques for aluminum conductors are readily acquired and successfully applied. Practically all



contractors consider present splicing techniques for aluminum conductors entirely adequate. (See Section No. 12 for additional discussion of this subject.)

### 51. *Additional Wiring Space Requirements*

Another difficulty that arises is that most electrical devices such as switches and starters are usually supplied with terminals suitable for copper cables. In many cases, the aluminum cable is too big and will require an adapter to fit the equipment lugs. Or the original lugs will have to be replaced by lugs suitable for aluminum cables, if this is possible. Since aluminum cables are usually one or two sizes larger, wiring space adequate for copper cables may become too crowded, thereby hindering the making of satisfactory connections.<sup>(22)</sup>

It is therefore essential that the engineer and contractor keep these considerations in mind when preparing specifications or ordering equipment. Many equipments can be supplied with connectors or lugs suitable for aluminum cables and with increased wiring space at little or no additional cost, if specified beforehand.

### [fol. 4883] 52. *Examples of Insulated Aluminum Cable Installations*

Actual installation of insulated aluminum cables in commercial and industrial establishments are relatively few, except for those owned by the various aluminum producing and fabricating companies. Among these, particularly notable recent installations are: (1) the ALCOA Building in Pittsburgh,<sup>(23,24)</sup> a sky-scraper-type office building, (2) the huge Davenport, Iowa, rolling mill of the Aluminum Company of America,<sup>(25)</sup> (3) the vast Kitimat electrical power, and aluminum producing complex of the Aluminum Company of Canada,<sup>(26)</sup> and (4) the heavy forge plant of the Aluminum Company of America in Cleveland.<sup>(27)</sup> These structures use aluminum branch circuit wires as well as aluminum cable feeders.

### 53. *Forge Plant Aluminum Cable Installation*

The forge plant installation was built in 1953. The choice of aluminum wires and cables was made on the basis of comparative bids in which quotations were received for both copper and aluminum cable conductors. The quotation for the entire job using aluminum conductors<sup>(22)</sup> was about 4 per cent lower than with copper conductors. It should be noted that since most of the heavy, low-voltage feeders were run as open wiring in lightweight aluminum utility baskets, the inherent price advantage of aluminum cables was not penalized by larger conduit requirements. Also that the percentage differential for those items involving direct comparisons between aluminum and copper conductors would have been much higher than the 4 per cent for the entire job.

### [fol. 4884] 54. *Aluminum Cable Installation in San Francisco*

Successful and economical installations have also been achieved by establishments other than the aluminum companies. A particularly interesting example is the distribution system of the 22-story Standard Oil Company office building in San Francisco. This system consists of aluminum cable risers in asbestos-cement ducts and was installed in 1949.

Aluminum cables were chosen after a comprehensive economic study involving copper and aluminum low-reactance bus, tubular bus, and copper cable, as well as aluminum cable-risers. The results of this study were published in 1952 and later, 1956,<sup>(21)</sup> were recalculated to conform with 1955 material and labor prices.

A comparison of all system costs, including main switchgear, external switching equipment, bus vault connections, conduits and total labor cost, as well as conductor costs, indicated that a copper cable installation would involve a total of 5.2 per cent more in 1949 and 7.2 per cent more in 1955. Of particular pertinence is the fact that all savings were in the conductor and labor costs. Using copper cables in 1955 would have required 34 per cent more for cable material costs and 4 per cent more in total labor costs.

It should be noted that the cable installation labor costs alone would reflect a much greater difference than 4 per cent.

[fol. 4885] 55. *Aluminum Cable Installation on Long Island*

Another interesting aluminum cable installation, this one in steel conduit, was installed during the Korean War period in a large Long Island Department Store.<sup>(32)</sup> Although the system had originally been designed for copper cables, the shortage of copper forced the substitution of aluminum.

It was found possible to switch to aluminum cable of nearly equivalent capacity despite the fact that the conduits originally specified for copper cables had already been installed. Moreover, since some copper cable was on hand, some feeders were installed with aluminum phase wires and copper neutral and others with copper phase wires and aluminum neutrals. Connectors and terminal lugs are bolted types and made of plated cast-copper alloy.

A recent inquiry revealed that after five years service, this installation continues to give satisfactory performance. No serious defects or problems have been encountered by the maintenance engineers, who regard the installation with considerable satisfaction and a certain pride in its uniqueness in their area.

56. *Previous and Recent Use of Aluminum Cables*

There are, of course, scores of other successful aluminum cable installations all over the United States and also in other parts of the world. The use of all-aluminum cable can be traced as far back as 1899,<sup>(16)</sup> of ACSR cable to 1909<sup>(16)</sup> and of insulated aluminum conductors to 1927.<sup>(33)</sup> [fol. 4886] However, the substantial use of insulated aluminum cables received its great spur during the copper shortage occasioned by World War II.

In 1947 a very considerable amount of insulated aluminum cable was shipped to hundred of installations all over the country, with one cable company alone supplying over half a million feet to seventy industrial plants and facilities.<sup>(34)</sup>

However, the vast majority of all building wire and cable installation has been and still remains copper. National (U.S.) Comparative Statistical information for the years 1955 and 1956 has been collected by the National Electrical Manufacturers' Association (NEMA), but is generally unavailable for previous years.

Table 9  
Building Wire Sales

Year	Copper		Aluminum	
	Millions of Dollars	per cent	Millions of Dollars	Per Cent
1955.....	113.9	99.5	0.58	0.51
1956.....	156.6	99.1	1.35	0.86

There is reason to believe that in previous years, notably 1947 and 1952 the percentage of aluminum wire was higher. One major cable company indicated that aluminum building wire and cable constituted 2 per cent of its gross sales in 1952 (during the temporary Korean War copper shortage) although only about 0.3 per cent in 1956.

[fol. 4887] The fact that in the past two years of relative normal supply, aluminum building wire and cable sales constituted less than one per cent of total building wire and cable sales should prove a powerful spur to aluminum cable sales organizations, since the potential area of economic application and use of aluminum building wire and cable is certainly far greater than this percentage.

### 57. Summary and Conclusions

The use of insulated aluminum wires and cables is now entirely practicable with the development of flexible, partially annealed conductors and satisfactory splicing and joining techniques. The major present problem in this area involves the education of engineers and contractors to this realization.

Considerable economies can be realized by the use of aluminum building wires and cables in view of existing price differentials between aluminum and copper insulated conductors. These economies are more apparent for rack or fibre-duct installations where the economy of the aluminum cables is not penalized by the need for larger metallic conduits. Considerable savings can also be realized in cable



and conduit installations for loads above 200 amperes. There appears to be good reason for appreciable savings in the use of aluminum branch circuit wiring in 480/277-volt systems.

Although there are many successful and economical installations of aluminum building wires and cables throughout the United States, the relatively small amount of aluminum building wire and cable sales as compared to copper, indicates that many economical applications are being overlooked or neglected. This represents a considerable challenge to design and sales engineers.

[fol. 4889]

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[fol. 4893] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 52 1739

An Address by

**A. D. R. FRASER**

President, Rome Cable Corporation

To the Members of the  
**ROCHESTER SOCIETY  
OF INVESTMENT ANALYSTS**

ROCHESTER, N. Y.

January 16, 1957

**ROME CABLE**  
CORPORATION

**1740**

**[fol. 4894]**

**ROCHESTER, N. Y.**

**January 16, 1957**

[fol. 4895]

On behalf of Rome Cable Corporation I wish to express our appreciation for your kind invitation to tell you something about our Company and the great electrical manufacturing industry of which we are a part.

I would like to divide this talk into four sections, one, some general background facts about our Company and the industry of which we are a part, second, financial facts, third, our organization and what it works with and something of what we are doing and fourth, some current estimates and a glance at the future.

Now, as to our Company, we were incorporated as a New York State corporation on January 20, 1936, which is just twenty-one years ago next Sunday. So, you see having come through infancy, youth, adolescence as we enter 1957 we are just coming of age. Those of you who can remember 1936 will have some memories that the country was in the midst of its worst depression and the idea of raising one and three-quarter million dollars to start a new company in an industry operating at 35 per cent of capacity did not have the investment appeal of brewery and distillery stocks, following in the wake of repeal of prohibition. We were among the first industrial companies to file a Registration Statement and Prospectus with the Securities & Exchange Commission. One week after the offering we had sufficient assurance to proceed on a small scale and had subscriptions for our entire million and three-quarter dollars by June and shipped our first product in mid July 1936.

We are a part of the electrical manufacturing industry which last year had an estimated gross output of nineteen and a half billion dollars. The wire industry with almost two hundred manufacturers does about 10 per cent of the electrical manufacturing industry total. Our industry consumes about half of the new copper consumed in the United States. Less than 15 percent of the total manufacturers produce the greatest percentage of the overall total. There are a large number of small



specialty manufacturers. Anaconda, Kennecott, Phelps-Dodge, American Smelting & Refining and more recently Consolidated Copper and Cerro de Pasco operate wholly owned or controlled subsidiaries. United States Steel Company and Colorado Fuel & Iron have electrical conductor operating subsidiaries. With the increasing use of aluminum as an electrical conductor ALCOA, Kaiser and Reynolds have been expanding their interests. Kaiser Aluminum just last week acquired the wire and cable facilities of the United States Rubber Company.

When we started in business in 1936, we were the only independent company to have its own copper rolling mill. Now there are three or four others. We were one of the earliest copper producing companies to also install our own aluminum casting and rolling mill. Our rolling mill and bare wire fabricating units process sizeable quantities for General Electric, Westinghouse and other wire fabricators. We have one wire and cable plant in Rome, N.Y., and a steel conduit plant in Torrance, California which we acquired in 1950. This is the only conduit plant in operation today west of St. Louis.

We started with a limited line of standard products of rods, bare and weatherproof wire which has now expanded to cotton, paper, asbestos and glass magnet wire, rubber and plastic construction wires, flexible cords, mining cords and cables, signal wires, control cables, rigid and thin wall steel conduit, high and low voltage overhead and underground cables, and many specialties for various industries and the Government. It is important to note that in times of emergency the same machines that produce civilian items can and have produced sizeable quantities for the military. We make tens of thousands of sizes and varieties from sizes smaller than the human hair to cables larger than your wrist. We sell approximately a quarter of our product to each of the following three groups: utilities and electrical manufacturing industry, other fabricators and electrical wholesalers, while about seven per cent goes to local, state and national governments of which a

[fol. 4897]

sizeable portion is for utilities and the balance of about fourteen per cent goes to industrial, chemical, oil, mining, railroad and a miscellany of other channels.

We sell through our own salesmen and some agents. We have eighteen offices, nine warehouses and almost three hundred other stocks strategically located throughout the United States.

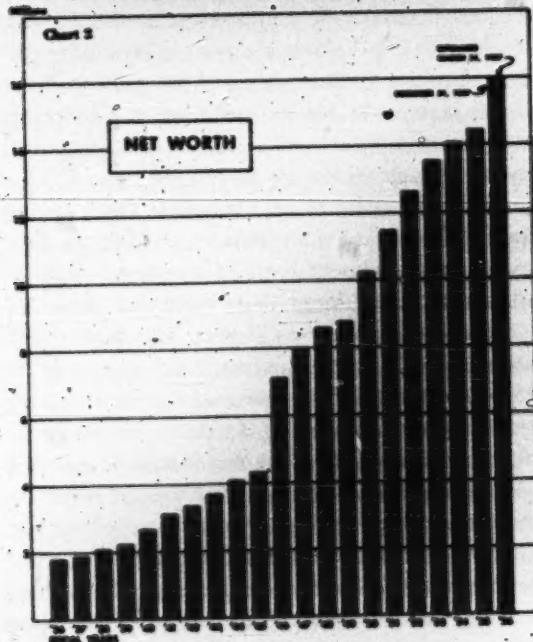
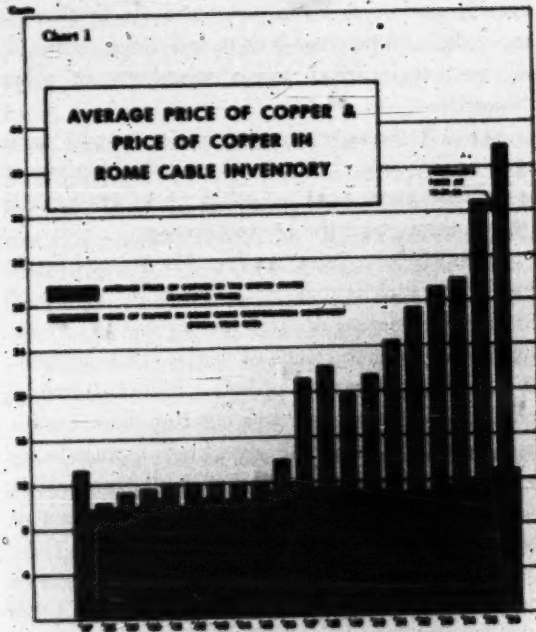
So much for a brief rundown on general items. Let us now look at some items on the balance sheet. Even in this period of tight money our receivables are turning over in excess of twelve times per year. We have sold in excess of half a billion dollars of products since our start and our bad debt loss has been only \$61,000, which gives high commendation both for the type of customers we have been dealing with, as well as our Treasurer's ability to get payment for what we ship.

From the start our cost of inventory has been taken on the well known and conservative LIFO principle. With copper selling at 36 cents in January our inventory cost approximates the 12 cent level. Chart No. 1 shows the average price of copper by years since 1937 to date and the price in Rome Cable inventory. Market price of our inventory today is over three and a half million dollars in excess of book value.

Net fixed assets of approximately eight million dollars for almost a million square feet of floor space and equipment have an appraised gross replacement value almost three times that figure.

By the end of our fiscal year, March 31, 1957, we will have an outstanding long term debt of \$3,049,000 at the favorable interest rate of 3.9 per cent. Further payments of \$460,000 will be made next year. As of March 31 this should be our only borrowing, and we have no present plans involving major financing for the new year.

With the addition of the shares issued on the 5 per cent stock dividend on January 4th we have 556,000 shares outstanding and 35,794 shares additional in treasury stock. We have almost 1900



[fol. 4899]

share owners and about one-third of outstanding stock is owned by employees and their families.

Chart No. 2 shows the growth of net worth since the start of the Company. At the time of the last quarterly report, at the end of September, it totalled \$15,300,000.

There is one item I would like to comment on and that is our investment in the American Synthetic Rubber Corporation, wherein five other wire and cable companies and a group of other mechanical rubber goods manufacturers formed a new company to purchase the assets of the Louisville plant of the Reconstruction Finance Corporation making GR-S Type Synthetic Rubber. This is an investment which gives us a call on a portion of their production and insures us an adequate supply as well as keeping us abreast of most up-to-date research activities in the production of this type of synthetic rubber.

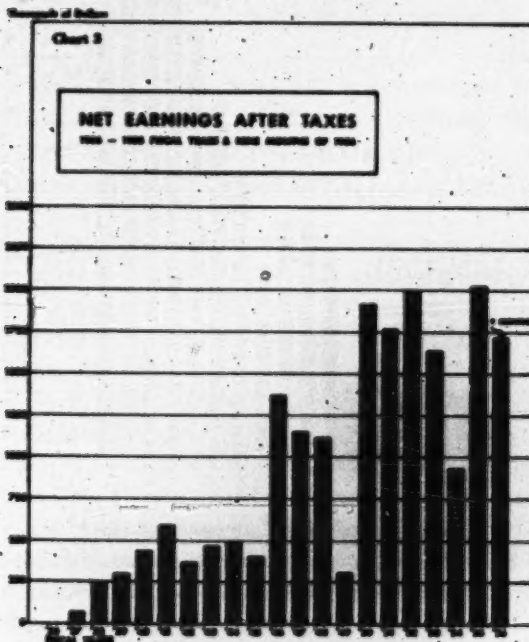
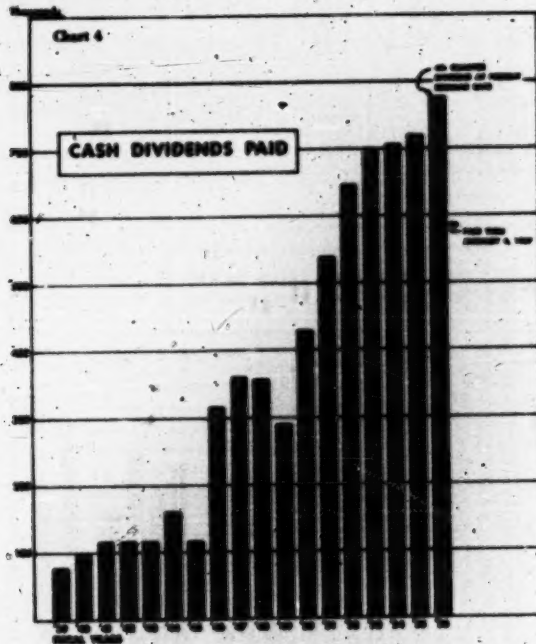


Chart No. 3 shows net earnings after taxes since the start of the Company. Total earnings to date

exceed nineteen million dollars which are after the heavy impact of taxes charged against a growth company. Our total direct tax bill since the start has represented almost 7 cents on the sales dollar, and when we add in withholding taxes paid for employees we come to a figure of over \$45,000,000 compared to the \$19,000,000 left as retained earnings.

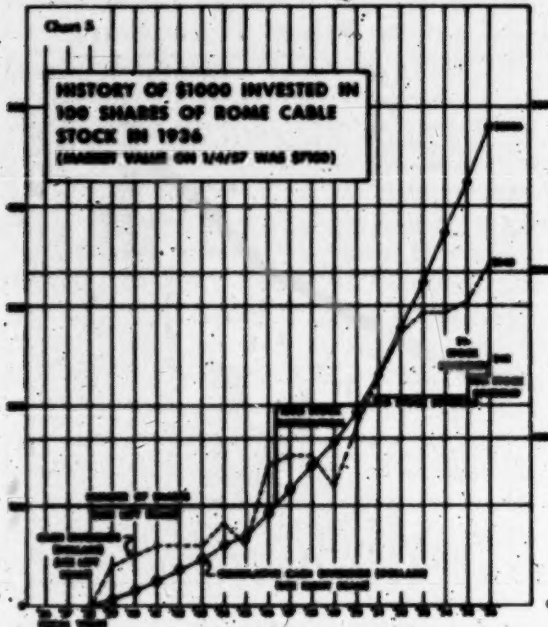
Chart No. 4 shows cash dividends paid since the start, a total of over \$6,400,000. In addition we had a 100 per cent stock distribution in 1947, a 5 per cent stock dividend in 1951, a 10 per cent stock dividend in February 1956 and another 5 per cent stock dividend in January of 1957.



I particularly call your attention to Chart No. 5 which gives the history of the investment of \$1,000 in 100 shares of Rome Cable Common Stock in 1936 when the Company was formed. If you will look at the chart you will notice that with the above stock distribution and stock dividends the share

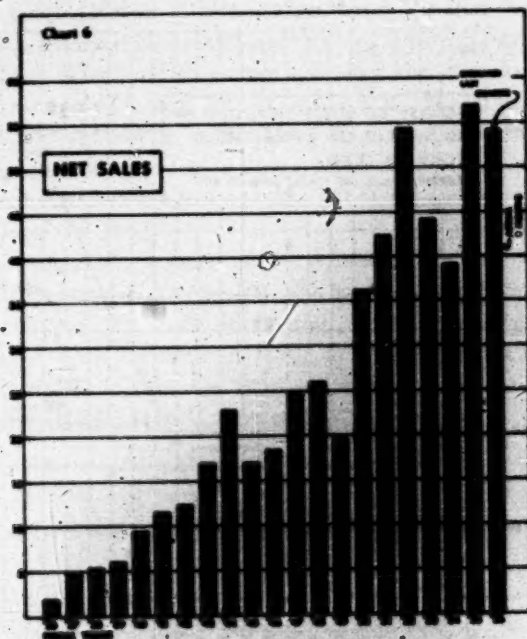


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owner would now hold 242 shares of stock with a market value of approximately \$7,100. He would have received \$2,886 in accumulative cash dividends to date, and his dividend income in fiscal year 1936 would total \$343.

The next Chart No. 6 shows the sales growth. In our first year, 1936, we had sales of \$1,800,000 and that climbed to almost \$57,000,000 last year. In the current fiscal year the total will be slightly less. We have been called a "war baby." I would therefore like to say for the record that our direct Government business in the current fiscal year is approximately 1 per cent. Both in World War II and the Korean episode our Company made significant contributions in specialized products, which added considerably to the sales volume in those periods. We were the main contractor to manufacture aircraft ignition leads in World War II and we held the largest contract to manufacture a special communication cable for the Signal Corps in the



Korean War. In both instances we made voluntary refunds to the Government of several millions of dollars.

Now let us come to the third part of this talk, namely, organization, what it works with and what we are doing. We have over fifteen hundred employees, only a small percentage of whom are unionized. We have a Board of Directors of twelve, eight of whom are working officers, comprising the executive committee. This provides flexibility and promptness of action. While organization does not appear as an item on the balance sheet we believe that as H. T. Dyett, Chairman of the Board and founder of the Company, said at the time of starting the Company "Organization is much more important than bricks and mortar."

While the Company is only twenty-one years old most of the major executives have had many more years of active experience in the wire and cable industry. Each year we have added a number of College graduates for a student training course.

Some of the early graduates of that course now hold leading positions in the Company. We have never had a work stoppage due to labor grievances.

I believe each of you have a copy of our last Annual Report, which shows that 67½ cents of our sales dollar goes for materials we use. This covers copper, aluminum, steel, rubber, plastics, cotton, paper, glass, lead, tin, zinc, chemicals and a whole host of other components. We consider our relations with our suppliers as one of our most important responsibilities. Diversity of supply, particularly in the major items, has saved us from the crippling shutdowns that have affected some in our industry.

Industry strikes throughout the world in 1955 which cut out approximately one month's production, plus the then booming European economy, ran the world price of copper in March of 1956 to approximately 55 cents per pound. Production caught up with and exceeded demand by mid-year, and the January producer price is 36 cents with some available in the world markets down as low as 34 cents. Aluminum which started the year in tight supply is now plentiful. Our suppliers and commitments for steel should take care of us adequately. So, as of this moment, we have no raw material supply problems.

Ours is a very competitive industry, so that in addition to expanding our facilities to take care of increased demand we are ever on the alert to provide the most modern equipment to get the best quality at the lowest cost. By the end of the current fiscal year we will have spent a yearly average of \$1,100,000 since the end of World War II for capital equipment. Our depreciation in the same twelve year period has been running at the rate of half a million dollars per year average; so you can tell from those figures that, in addition to funds from our long-term loan, a sizeable portion of retained earnings has been plowed back for this purpose. In the current fiscal year our total expenditures will approximate our present depreciation rate of about \$800,000. In the last two fiscal years

earnings have been charged with approximately a total of \$300,000 as plant rearrangement costs for more efficient production with an expected annual savings therefrom in excess of half a million dollars gross per year.

In 1956 and 1957 we will have doubled our capacity for production of aluminum rod, have added to our insulating, extruding, cabling and drawing equipment. We will also have facilities for enameling rectangular magnet wire, besides adding capacity in many other lines, particularly in the rapidly growing and less competitive high voltage field.

We are a Company that believes in incentives. Practically all of our direct labor operations have been on piece work, or bonus systems for many years. Starting January 2nd all of our indirect workers at the Rome plant are included under a new incentive production plan. With the issuance of the original prospectus we included a management bonus plan which enabled us to start with moderate salaries with improved compensation as earnings warranted it. The same holds true for other key employees who are covered by a supervisory bonus. Furthermore, since the start of payment of the first dividend to share owners all employees, other than those included in the executive bonus plan, have been covered by what we have called an Employee Dividend-Sharing Plan, which has been adopted by several other companies in United States and elsewhere. Almost two and a half million dollars have been distributed under this Plan since the start.

Recognizing the difficulties of providing adequate compensation under present tax laws and the added incentive of key employee stock ownership, our share owners approved in 1950 offering shares to employees on a ten year purchase plan. Ninety-seven employees have shared in the distribution of 46,175 shares under this authorization. At last June's meeting share owners further authorized 36,000 shares on a Stock Option Plan. We have

up-to-date pension and profit-sharing plans, provide sick and accident, medical and hospitalization coverage, as well as a Company and Employee contributed Group Life Plan with an average coverage of over \$6,000.

Like Eastman Kodak, who were most helpful in getting our own plan started, we have a full-time Medical Director, with nursing staff, laboratory technicians and equipment, so that all employees get an annual physical examination. I could spend considerable time extolling the virtues of this program alone.

We are also great believers in the matter of keeping our employees up-to-date on happenings in the Company or the national scene which affect their livelihood, and have carried on plant-wide courses to all employees to better acquaint our people with the workings of our private enterprise system and how our Company fits in as a part. We likewise believe in upgrading or promoting from within the organization and have a full-time educational director working with our student course, interviewing graduates, checking candidates for Foundation scholarships and eventually arranging other educational in-plant work.

Our people are active in the life of the community, and our executives are serving in important industry, state and national organizations. We aggressively pursue improvement of relations with share owners, customers, suppliers, employees and the public.

In 1952 the Aluminum Company of America decided to enter the insulated aluminum conductor field and entered into an agreement with us to insulate bare conductor, which they furnished us, with rubber and plastic covering for their selling. This has been a very satisfactory arrangement for both companies. We gained increased production output and experience. In the latter months of 1956 they have installed their own plastic covering equipment at Massena.



Our changing economy with its heavy taxation burden has shifted an increasingly large responsibility on industry for contributions to educational, religious and a wide variety of charitable institutions. Rome Cable Foundation was started by the Company in 1952 as a means of better carrying out our part. Annual contributions have been made by the Company to the Foundation. Forty-seven scholarships have been granted to sons and daughters of the community, of which about half have been to relatives of employees. The Foundation now has assets totalling over one-quarter million dollars and is earning 4.5 per cent on its investments.

In our rapidly moving age of change and progress I wonder how many of you realize the many major items in our daily life that we accept which we did not have in 1936 when our Company was started. There was no FM radio, no TV, no jet airplanes, no 300 horsepower automobile engines, no guided missiles, no atom bomb, no H-bomb, nylon was a rarity and there was very little diesel transportation. The use of gas and oil for heating wasn't general. There were very few deep freezers. The heat pump was unheard of, the outdoor movies, and the three-D dimensional movies or cameras were not common. Hosts of new electrical appliances have come into being.

Likewise in our industry we started out with copper as our only conductor, and natural rubber as our main insulation. We now have man-made rubber of several varieties, Neoprene, GRS, Butyl, the Isocyanates, a great variety of plastics of which Poly-vinyl chloride and Polyethylene are most used, but there are many more. I had one of the executives of a chemical company tell me the other day that they were furnishing industry with twenty-two different kinds of plastics, and they had nineteen more they were working on in the laboratory. Glass fibers have become an important use item with us. In the last five years aluminum has become an important base conductor for insulated wire. In 1952 it only represented 5 per cent of our total volume in

[fol. 4907]

copper equivalent whereas in this last year it has climbed to almost 25 per cent of our total.

I have told you all this as background because it emphasizes the importance of research. I have seen some figures that state that industrial research only totalled approximately one quarter billion dollars in 1940 and is now running at the rate of seven billion dollars annually. The electrical manufacturing and machinery industry is currently spending 30 per cent of the total research and development expenditures of the country. While our research and development budget is not equal percentage-wise to some of the large units in the electrical manufacturing industry, we believe our budget proportion equals or exceeds other leaders in our industry. Fruits of that excellent work of the Research and allied departments can be gained from the fact that 39 per cent of the products which we sold this year we were not making at the end of World War II. Because it has been proven that dollars invested in research, return many times in volume and earnings, and with the many new challenges presented to us by suppliers and customers our program for research is being expanded in the next and succeeding years. I have a number of samples on the table here that you can look at, if you desire to do so after the meeting. I want to speak particularly about one, however, a Polyethylene Insulated Power Cable, which is the product of our Research and Engineering, a 34.5 KV Cable which I believe is the highest voltage polyethylene cable in actual use in an industrial company in this country.

As Investment Analysts I presume you are particularly interested in earnings for the current and future periods. I hope that my predictions will be better than the Michigan editor who seventy years ago writing under a gas lamp said "electricity is developed by waste and disturbance of atoms which is expensive. The great mass of people will never use this costly illumination to banish darkness from their humble dwellings." For the period ending December 31, 1936, which is the third quarter of

our fiscal year, we estimate our earnings to be about the same as the corresponding period of a year ago, but down approximately 15 per cent from the previous quarter in this year. This is due mainly to drop in sales volume and change in product distribution, caused in some part by heavy inventory liquidations by some of our customers owing to high prices of copper. Although fourth quarter sales are estimated at lower than those for the one just ended, overall earnings for the year should better last year's record.

Now as to the new fiscal year, which we will start in April, we like to use the newspaper headline used in connection with Secretary of Commerce Weeks' yearend statement, which said that the Outlook for 1957 was bright but prosperity was not automatic. Specifically we do not believe we will be troubled with raw material supplies. A rising number of companies have made settlements of labor contracts for three years; so we should have a longer period of labor peace.

Our industry serves utilities, electrical manufacturing, construction, mining, oil, chemical, automobile, airplane, communications, railroads, as well as Government. Almost without exception the difference in predictions for 1957 by the various economists is one of the amount of increase. Preliminary survey of utility expenditures and budget made by McGraw-Hill estimate increases as high as 20 per cent in the new year. Estimates for new plant and equipment are up as high as 11 per cent. New housing starts may be down but the size of homes is increasing due to population and income increases. Coupling this with commercial, industrial and public construction plans, overall construction should be higher. Coal mining industry is definitely on the upgrade. Recent world events are going to add 10 per cent to Government defense spending, and the Middle East situation will require further increases in the oil industry. The automobile and airplane industries are scheduling higher production levels. Railroad equip-

[fol. 4909]

ment backlogs are heavy. The chemical industry as a service industry and supplier of all industries will also be up. The need for rewiring of most homes over five years old to provide increased power for the many new electrical appliances necessary to modern living provides an increasing market. The slogan of the campaign launched last year "Live Better Electrically" is catching on apace. Gross national product and consumers spending are estimated to be up 4 to 5 per cent.

On the other hand, there are other factors which must be recognized as progress deterrents. Inflation continues with the annual hypodermic of wage increases. Price increases are generally not sufficient to offset these rising costs, and even increased productivity from better mechanization and labor efficiency has not kept pace with these added costs. Foreign competition is increasing in many industries.

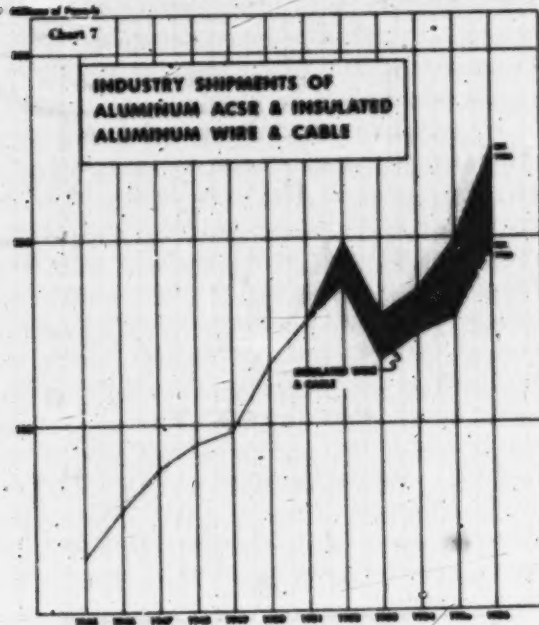
You have seen indications of deferment of some capital expenditures due to the tight money market. The growing need for municipal and state services for schools, hospitals, roads and public buildings which has mushroomed their taxation programs is going to be a further significant drain on corporation profits. Excessive taxation deprives companies and higher income individuals of "seed money."

We need a more realistic approach to depreciation by recognizing replacement costs as a means of providing money to finance the future. In 1955 depreciation of all industry totalled fifteen billion dollars, and with the retained earnings of about ten billion above dividends this was close to financing the total of plant and equipment corporate expenditures of twenty-seven to twenty-eight billion. In 1956 with a thirty-five to thirty-eight billion dollar budget there is a much wider gap. With 1957 scheduled between forty and forty-five billion emphasizes need for a more realistic approach by Government on the subject of "stay even" depreciation. The above factors will put additional strains on the profit picture and mean narrowing of margins for many industries.

In our own industry we expect that some of the adverse factors of inventory liquidation may reduce volume in the early part of the year, but we look for volume in this year as a whole to be better than in 1936.

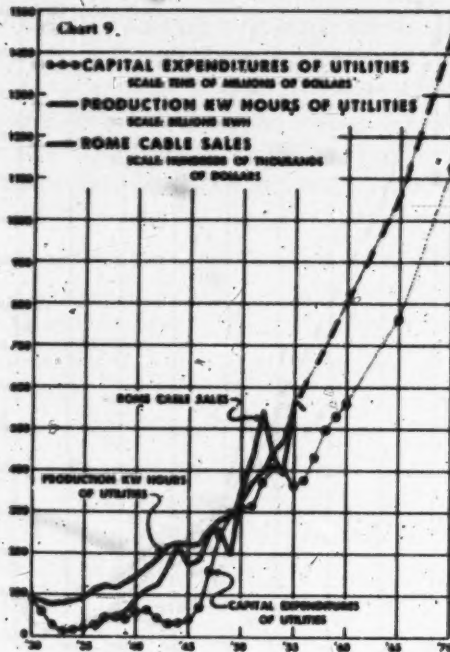
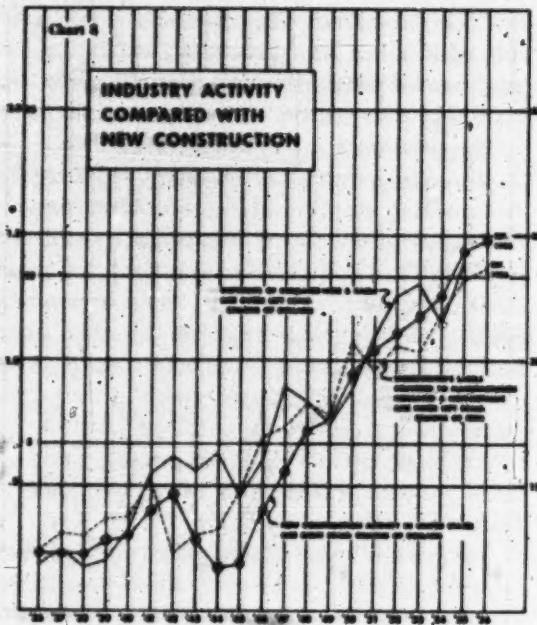
Now we come to the "Great Beyond" or the period following 1937 on a long range basis. Chart No. 7 shows the tremendous growth in the use of aluminum as an electrical conductor. Note the rapidity of growth of the insulated product in the last few years. Chart No. 8 shows that paralleling of insulated wire and cable shipments and construction wire labels purchased compared to the construction activity index, which would indicate that as that progresses so should sales volume on insulated wires and cables.

Chart No. 9 is a most interesting one. We used it as far as capital expenditures and production of Kilowatt hours were concerned in our original prospectus in 1936. We have now plotted our sales volume and note how it has kept pace with the kilo-





[fol. 4911]



watt hour production. The projections of McGraw-Hill on Kilowatt hour production and capital expenditures of utilities are shown on the graph and if we kept pace you could easily project our sales.

The electrical manufacturing industry was a six billion dollar industry in 1936 when we started. In his remarks to the National Electrical Manufacturers Association at its annual convention in Atlantic City last Fall, Ralph Cordiner, President of General Electric Company, predicted it would be a ninety billion dollar industry by 1976 and that Gross National Product would double what it was in 1956, and that kilowatt hour output would be four times greater than the six hundred billion of 1956. He further stated that the electrical manufacturing industry has been growing from two to three times as fast as the economy as a whole.

You are well aware of the forecast on population increases, so that even maintenance of present, living standards is going to tax our productive machinery. If the wire and cable industry were to maintain its proportion of the total electrical manufacturing industry, it would mean volume of four times the present levels by 1976.

In conclusion I can only say that our organization is alert to the opportunities which lie ahead and by continued effective teamwork will accept and meet whatever challenge the future holds for us.

[fol. 4913] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 53

Minutes of Meeting of Executive Committee of  
Rome Cable Corporation, November 6, 1950

A meeting of the Executive Committee of Rome Cable Corporation was held on Monday, November 6, 1950, at 11:00 A.M.

There were present: Messrs. Barnard, Collins, H. T. Dyett, Ellis, Fraser, Rolston and J. H. Dyett.

The Secretary read the minutes of the meeting of October 27, 1950 which minutes were unanimously approved as read.

Mr. Fraser reported on Mr. Andersen's visit to Rome on November 3rd. He pointed out that with increases over estimates the total building and equipment program at Torrance now totalled \$1,236,000. At the meeting with Arthur Andersen an additional amount of \$24,000 was approved for the wiping and cooling equipment and \$100,000 for a second heavy tube mill. In respect to the tube mill the supplier has agreed to a cancellation clause until January 15, 1951. It was the unanimous decision of the Committee that these purchases be approved. Mr. Fraser pointed out that an additional \$50,000 would be needed to complete the tube mill if the order is not cancelled prior to January 15, 1951.

Mr. Fraser further reported on his very satisfactory talk with Mr. Andersen who indicated that he was willing to stay with the company at least until January 3, 1953.

A discussion followed covering certain features of a deferred compensation plan but no decision was made pending further study by Messrs. Fraser and H. T. Dyett.

Mr. Rolston reported on expansion plans of Southern Electrical Corporation in the manufacture of aluminum. He also advised of the speed at which this company is drawing aluminum. It was thought that a further study of developments at Southern Electrical Corporation might be made.

[fol. 4914] Mr. Ellis presented the following E.R. which was unanimously approved:

E.R. No.		Amount
1418	Furniture and Fixtures to be purchased during second half fiscal year 1950	\$3,850.

The Secretary advised that a Corporation Deed-Easement resolution should be approved at the meeting covering water rights at the Torrance Plant and after discussion, upon motion duly made, seconded and unanimously carried it was

Resolved, that for and in consideration of the sum of \$1.00, the Corporation does hereby grant, convey, and dedicate to the City of Torrance the right of way for the construction of water line and appurtenances thereto, situated in the County of Los Angeles, State of California, described as follows:

Beginning at a point S. 89° 25' 50" W. a distance of 432.99 feet from the Southeasterly corner of Lot 5 of Tract 5944 as recorded in Map Book 64, page 82 of Records in the County Recorder's Office, Los Angeles County, State of California; thence N. 0° 34' 10" W. a distance of 312.02 feet to the Southerly line of Lot 29 of said Tract 5944; thence S. 89° 25' 50" W. a distance of 5.00 feet; thence S. 0° 34' 10" E. a distance of 312.02 feet to the Southerly line of Lot "A" of said Tract 5944; thence N. 89° 25' 50" E. a distance of 5.00 feet to the point of beginning.

There being no further business to come before the meeting it was adjourned.

John H. Dyett, Secretary.

[fol. 4915] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 54

To: A. D. R. Fraser  
From: R. A. Schatzel  
Date: March 28, 1951  
Subject: Aluminum

CC: G. E. Rolston

This is not a new subject in our discussions and we decided several months ago to produce Aluminum Line Wire and Self-Supporting Service Drop Cable. This would involve our purchasing #6—4 and 2 AWG. solid and stranded Aluminum conductor and insulate with Neoprene or Polyethylene in our mill. When volume of such wire warranted our devoting a machine to it we could draw such wire without difficulty. I believe arrangements are now made to purchase such wire when C.M.P. goes into effect around July.

If C.M.P. does not go into effect we would apply for permission to use Aluminum and produce such wire.

This restricted field appears to be a very sound application for Aluminum. As I mentioned sometime ago, and as we know when the presently contemplated construction is completed we will have, within a few years, double the ingot production of Aluminum in this country. A similar expansion is taking place in Canada; in fact, a greater expansion. It is estimated that there will be an abundance of Aluminum ingot available, beyond our normal peacetime, or even the present emergency needs within a period of about three years.

The efforts of Kaiser, Reynolds and Aluminum Company of America have created a wide interest in Aluminum, for certain insulated cables.

In Boston last week Mr. Avila of Boston Edison stated, "we will just have to learn how to use Aluminum; because of cost".

I have received an invitation to attend a special meeting of Committee IX of the Signal Section of Association of



American Railroads on April 3. Among the subjects to be discussed is substitute materials, and Aluminum conductors suitable for Railroad use.

I believe the approach we would make in producing a limited line, where Aluminum has found ready acceptance, is sound.

I would suggest that, if we find C.M.P. is not to be made effective, we apply for a position in Aluminum as above outlined. If we are to start production in July or August we would need to place an order for such conductor sometime in April or May.

I believe that the situation on Neoprene will be considerably relieved by August.

RAS P

R. A. Schatzel

[fol. 4916] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 55

To: J. R. Woods

From: R. A. Schatzel

Date: April 26, 1951

Subject: Consumers Power Corp., Self-Supporting SD

CC: F. S. Marks and AERF, A. K. Buckenmaier

Dear Jack:

Thanks for your fine letter of April 12. I can appreciate that you are disturbed by the importance which aluminum has taken, particularly for SD cable, both open wire and self-supporting. I believe we can best meet a situation by recognizing the facts. We have watched this situation for some time. Utilities throughout the country have been making similar studies and many have made trial installations over the past few years. They had a bad scare sometime ago over the shortage of copper and have not forgotten it. There is an aversion to the use of aluminum because of its low strength, difficulty to terminate, tendency to break wherever it is notched, as by a knife in stripping insulation. There is much for each utility to learn before they can have a trouble-free system approaching the experience with copper. However, there is a great economic incentive at the present time and with proper training and

pretation there are some places where aluminum can satisfactorily substitute for copper. Service Drop Cable—Self-Supporting type, is one of them. Open wire in light loading districts is another. The use of Copperweld or ACSR messenger in self-supporting type eliminates the great disadvantage of low strength which Aluminum, by itself, has.

If the utilities are satisfied to use Aluminum SD we may consider supplying it later in the year and your suggestions on this will be appreciated.

Now to turn to questions you raise. Copper is superior to aluminum for practically every application. Inherently aluminum has technical disadvantages. Your questions, however, are largely economic.

1. If I were to gaze in the crystal ball I would say that the price ratio between aluminum and copper would remain in the future and probably increase in favor of aluminum. The reason for this is that there are large new sources of aluminum being developed which will more than double the ingot capacity of aluminum in this country and Canada. No similar expansion of copper is in sight.

2. In heavy loading areas aluminum lines are not reliable. In light loading areas, or where structures involve ACSR there is no question that aluminum installed costs are in about the same ratio as the cable cost, and lower than copper.

[fol. 4917] 3. Rome would furnish copperweld messengers for copper, or hard-drawn copper. Either is OK with us.

4. On cable above #4 AWG. aluminum (#6 copper equivalent) cost is in favor of aluminum. We refer now only to Service Drop.

In the matter of attachment I enclose some information obtained from Public Service of Northern Illinois and Detroit Edison. You are very close to Detroit Edison and I believe it may be well to discuss this with them. The attached sketches show practical methods which have proven satisfactory.

As you probably know, Detroit Edison have approved our all Neoprene construction, and I understand from Bob Graham's visit, that they are very well satisfied with it.

Summarizing, I believe there are economic advantages

for certain applications of aluminum for electrical conductors which no utility engineer may afford to overlook. We as a manufacturer of cable must also consider these advantages.

There are well known technical disadvantages of aluminum and for many applications these far outweigh the economic.

In certain locations after crews are properly trained and practical experience is gained, aluminum can be as satisfactory as copper and the economic advantages realized. Self-Supporting Drop wire with Neoprene insulation appears to be one of these. There are precautions to be observed and any company would be ill-advised to rush headlong into it. Open wire for light loading districts has possibilities, although I hear that heavy wind storms have taken down all straight aluminum lines in Oklahoma. ACSR has the required strength.

We believe Consumers Power should study the application of aluminum for Service Drop and other applications just as we are. There is much to be learned about installation and installation practices.

Copper is an ideal material both physically and electrically and we all have years of experience in its use. Aluminum is not as ideal and many adjustments must be made and much experience gained before it can be as satisfactory.

RAS P  
Attach.

R. A. Schatzel

[fol. 4918] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 56

Minutes of Meeting of Board of Directors of Rome Cable Corporation, May 18, 1951.

A special meeting of the Board of Directors of Rome Cable Corporation was held in the main office of the Corporation, Ridge Street, Rome, New York, on Friday, May 18, 1951 at 10: A.M.

There were present: Messrs. Fraser, H. T. Dyett, Barnard, J. H. Dyett, Collins, Ellis and Rolston, being a ma-

jority of the members of the Board and a quorum. Messrs. Loeb and Sharp were absent.

Mr. H. T. Dyett, Chairman, presided and Mr. Vohn H. Dyett, Secretary of the Corporation, acted as Secretary of the meeting.

The Secretary presented to the meeting a copy of the Notice of Meeting, together with his affidavit of service thereof, and upon motion duly made, seconded and unanimously carried, it was

Resolved, that the copy of Notice of Meeting together with his affidavit of service thereof, as presented to the meeting by the Secretary, be and they hereby are approved and ordered prefixed to the minutes of this meeting and marked Exhibits 1 and 2, respectively.

The Secretary read the minutes of the Board of Directors meeting held February 21, 1951 and the minutes of the Executive Committee meeting held April 30, 1951, which minutes were approved as read. Upon motion duly made, seconded and unanimously carried, it was

Resolved, that all actions of the Executive Committee since the last meeting of the Board of Directors be and they hereby are approved to be the actions of the Board.

The Chairman read the report to the Board of Directors covering operations for the last quarter. Upon motion duly made, seconded and unanimously carried, it was

Resolved, that the report of the Chairman be accepted and placed on file.

[fol. 4919] In his report, the Chairman recommended consideration be given to payment of the Preferred Stock dividend. After discussion, upon motion duly made, seconded and unanimously carried, by roll call vote, it was

Resolved, that there be and hereby is declared from the earnings of this Corporation, Dividend No. 20 for 30 cents per share of the 4% Cumulative Convertible Preferred Stock of the Corporation payable July 2, 1951 to holders of record on the 11th day of June,



1951. The Treasurer is directed and authorized to cause the same to be paid on the date specified.

In line with the recommendation in the Chairman's Report as to the Common Stock Dividend, upon motion duly made, seconded and unanimously carried, by roll call, it was

Resolved, that there be and hereby is declared Dividend No. 49 for 25 cents per share on the Common Capital Stock of the Corporation, payable July 2, 1951, to holders of record at the close of business on the 11th day of June, 1951. The Treasurer is directed and authorized to cause the same to be paid on the date specified.

The Chairman advised that with each declaration of Common Stock dividend in the past an Employee Dividend had also been declared and in view of the above declaration asked for a resolution covering employee payment. Upon motion duly made, seconded and unanimously carried, by roll call vote, it was

Resolved, that whereas there has just been declared Dividend No. 49 on the Common Stock of this Corporation authorizing payment of 25 cents, of which 20 cents is regular and 5 cents extra, per share on July 2, 1951 and

Whereas, the rules and regulations of the Employee Dividend-Sharing Plan, as approved by the Stockholders, permit payment to employees at the same rate as to stockholders based on computed participating units and upon approval of such payment by the Board of Directors, be it

Resolved, that the Treasurer is authorized to make such distribution to all eligible employees on July 2, 1951.

The Secretary advised that 4302 shares of Cumulative Convertible Preferred Stock had been purchased for the sinking fund and after discussion upon motion duly made, seconded and unanimously carried, it was resolved that

[fol. 4920] Whereas, the Certificate of this Corporation filed pursuant to Section 11 of the Stock Corpora-



tion Law, dated the 20th day of June, 1946, creates a sinking fund for the retirement of this Corporation's 4% Cumulative Convertible Preferred Stock and in connection therewith provides in paragraph III D as follows:

"D As and for a sinking fund for the retirement of the 4% Cumulative Convertible Preferred Stock, the Corporation shall, during each fiscal year, commencing with its fiscal year beginning April 1, 1948, apply a sum equal to 5% of its net earnings for the preceding fiscal year, in the purchase, at not exceeding the then current redemption price, and/or in redemption and retirement of shares of the 4% Cumulative Convertible Preferred Stock."

and

Whereas, the "net earnings of this Corporation as defined in paragraph IV. 9 of this Corporation's Certificate of Increase of Capital Stock, Authorization of New Shares and Classification of Shares, filed pursuant to Section 36 of the Stock Corporation Law, dated the 19th day of June, 1946, means "the net income of The Corporation and any subsidiaries on a consolidated basis as determined in accordance with generally accepted principles of accounting practice"; and

Whereas, said net earnings so determined for the fiscal year of this Corporation preceding April 1, 1951 (viz., its fiscal year ending March 31, 1951) amount to \$1,922,136 and 5% thereof amounts to \$96,106.80 and

Whereas, this Corporation has acquired, at a total cost of \$96,146.25 and now holds 4302 shares of its 4% Cumulative Convertible Preferred Stock; and

Whereas, paragraph IV 5 of said Certificate dated the 19th day of June, 1946, provides as follows:

"5. Shares of Preferred Stock that shall have been redeemed, or that shall have been purchased pursuant to (or purchased and for which credit shall have been taken against) any obligation of the Corporation for the purpose of a sinking fund, or that shall

have been converted into shares of any other class or series, shall not be reissued or otherwise disposed of and shall be cancelled. Any other shares of Preferred Stock acquired by the Corporation, except as otherwise provided herein, may be reissued."

Now, Therefore, be it

Resolved, that the 4302 shares of 4% Cumulative Convertible Preferred Stock so acquired and now held by this Corporation be deemed to have been purchased pursuant to the obligation of this Corporation under [fol. 4921] the sinking fund provisions hereinbefore set forth, and that said 4302 shares of said 4% Cumulative Convertible Preferred Stock be retired and cancelled and shall not be reissued; and be it further

Resolved, that this Corporation eliminate the said 4302 shares of its 4% Cumulative Convertible Preferred Stock by filing a certificate for that purpose with the Secretary of State of the State of New York pursuant to Sec. 28 of the Stock Corporation Law; and it was further

Resolved, that the President or a Vice-President and a Secretary or an Assistant Secretary of the Company be, and they hereby are, authorized and directed to prepare, execute and file such certificate and to take all proceedings and steps necessary to accomplish the elimination of such shares.

The Secretary presented to the meeting a proposed notice of meeting of stockholders, proxy statement and form of proxy. After discussion, upon motion duly made, seconded and unanimously carried, it was

Resolved, that the Secretary of the Corporation be and he hereby is authorized and directed to call the annual meeting of the stockholders of the Corporation for June 20, 1951 at 10 o'clock A.M. Eastern Daylight Saving Time to be held at the office of the Corporation, Ridge Street, Rome, New York and it is

Further Resolved, that the stockholders of record as of the close of business May 18, 1951 shall be entitled to notice of, and to vote at, the meeting to be held June 20, 1951; and it is

**Further Resolved**, that the notice of meeting, proxy statement and form of proxy, all as presented to this meeting; be and they hereby are in all respects approved as to form and content; and it is

**Further Resolved**, that the Secretary of the Corporation be and he hereby is authorized and directed to file the notice of meeting, proxy statement and form of proxy all as in the form presented to this meeting, with the Securities and Exchange Commission, and to mail the same not later than May 25, 1951, with such changes as the Executive Committee of the Corporation may hereafter approve, to stockholders of record as of the close of business, May 18, 1951; and it is

**Further Resolved**, that the copies of the notice of meeting, proxy statement and form of proxy be placed on file.

The Secretary read the annual report to stockholders and presented the financial statements thereto annexed and upon motion duly made, seconded and unanimously carried, it was

[fol. 4922] **Resolved**, that the annual report to the stockholders and the financial statements thereto annexed be and they hereby are in all respects approved as to form and content, and it is

**Further Resolved**, that the Secretary of the Corporation be and hereby is authorized and directed to file the annual report to stockholders with the financial statements for the fiscal year ended March 31, 1951 thereto annexed, as in the form presented to this meeting, with the Securities and Exchange Commission, and mail the same not later than May 25, 1951 with such changes as the Executive Committee of the Corporation may hereafter approve, to stockholders of record as of the close of business May 18, 1951; .

**Further Resolved**, that a copy of the annual report to stockholders with financial statements for the fiscal year ended March 31, 1951 thereto annexed be placed on file.

The Secretary advised that with the conversion of the 4% Cumulative Convertible Preferred Stock of the Com-

pany stockholders were receiving Common Stock Fractional Scrip, for which a provision to purchase should be made. Upon motion duly made, seconded and unanimously carried it was

Resolved, that, subject to statutory and contractual limitations, the President, Treasurer or Secretary of the Company be, and each of them hereby is, authorized in the name of, and on behalf of, the Company to purchase, from time to time, the Company Common Stock Fractional Scrip, resulting from the conversion of the Company's Preferred Stock, whether or not the certificates for such Scrip were issued more than three years prior to the date of purchase thereof by the Company; and be it further

Resolved, that the President, Treasurer or Secretary of the Company be, and each of them hereby is, authorized in the name of, and on behalf of, the Company, from time to time, to sell, assign, transfer and deliver the Company's Common Stock Fractional Scrip acquired pursuant to these resolutions, and be it further

Resolved, that the price at which Fractional Scrip shall be purchased or sold pursuant to these resolutions shall be the market price, on the date of any such purchase or sale, of a full share of the Company's Common Stock multiplied by the fraction to be purchased or sold, as the case may be; and be it further

Resolved, that the President, Treasurer or Secretary of the Company be, and each of them hereby is, authorized in the name of, and on behalf of, the Company to deliver certificates for Common Stock Fractional Scrip, which may hereafter be owned and held by the Company, aggregating rights to receive one or more full shares of Common Stock to Guaranty Trust Company of New York, Transfer Agent, in exchange for a full share or shares of the Company's Common Stock; and be it further

Resolved, that said officers of the Company be, and they hereby are, authorized and empowered to execute such documents,

[fol. 4923] Take such steps and perform such acts as may in their judgment be necessary or incident or



convenient to the carrying out of the purposes of these resolutions, and any such documents executed or acts taken by them shall be conclusive evidence of their authority in so doing.

The Secretary reported that approval of the auditing firm of Ernst & Ernst for the ensuing year should be considered and upon motion duly made, seconded and unanimously carried, it was

Resolved, that the firm of Ernst & Ernst be and hereby is designated as auditors for the fiscal year ended March 31, 1952.

In line with the Chairman's Report unanimous approval was given to the following E.R.'s and additions to E.R.'s:

E.R. No.	Rome Plant	Amount
4914	Purchase and install two lighting transformers each 50 KVA, 2300-V Primary, 110 V Secondary.....	\$ 3,000.00
1450	Purchase and install one 12-wire 8" High Speed Tubular Strander, which will replace a 7-wire 8" Strander #38-14.....	16,000.00
1451	Purchase and install one 7-wire 12" High Speed Tubular Strander, which will replace a 7-wire 8" Strander #38-11.....	13,000.00
1452	Purchase and install two magnetic gauges on flat rolling machines.....	4,000.00
1453	Purchase and install pneumatic oven operating device on Machine No. 55-1.....	300.00
1454	Purchase and install a ventilating fan over the Sheeting Mill under 3-A Banbury Mixer in the Plastic Mixing Dept.....	500.00
1455	Construct and install three (3) improved-type payoffs at sparking units in Synthanol Dept.....	500.00
1456	Purchase and install one (1) Barrett Yarn Saturating Machine.....	10,400.00
1457	Complete enclosure for three (3) trucks at Shipping Dept.....	18,000.00
		<u>\$65,700.00</u>

[fol. 4924]

1415-A	For an additional appropriation to cover additional cost of office addition as shown on the attached tabulation.....	\$22,854.20
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#### Torrance Plant

C-98	Let contract for grading and paving areas #2 and #3, 57,675 sq. ft., and resurfacing area #1, 14,430 sq. ft. Paving to be 4" asphalt concrete over asphalt concrete over 2" base of local material. Resurfacing to be 2" with asphalt binder for water seal on all edges...	10,600.00
C-105	Purchase 1 Mercury Abrasive cutoff saw with 7½ H.P., 220 V, 60-Cycle, 3-Phase motor & control.....	730.00



E.R. No. Supplemental E.R.'s—Rome Plant		Amount	
C-109	Purchase 1-Landis "Lanhydro" automatic double end pipe threading machine.....	25,000.00	
C-110	Construct storage and operating racks for elbow plater.....	187.77	\$36,517.77
<hr/>			
Supplemental E.R.'s—Torrance			
C-34-B	Distribute professional fees to North building extension.....	2,928.00	
C-35-C	Distribute professional fees to office modification.....	816.00	
C-36-B	Distribute professional fees to machine shop addition.....	722.00	
C-50-A	Make additional expenditures on slitting line installation.....	10,200.00	
C-79-B	Purchase and install additional equipment for sulphuric acid storage rack.....	350.00	
C-88-A	Distribute professional fees to hot dip building.....	10,534.00	\$25,550.00

The President reported that an advertising budget had been submitted by Mr. Thayer, and after discussion upon motion duly made, seconded and unanimously carried, it was

Resolved, that an advertising budget of \$125,000 for the 1951 fiscal year be and hereby is approved. Suggested financial advertising in certain papers and magazines was presented by the Secretary, and it was the [fol. 4925] unanimous decision to leave final approval to Messrs. Fraser and J. H. Dyett.

Consideration was given to having an appraisal made of the Company's Torrance property, and after discussion upon motion duly made, seconded and unanimously carried, it was

Resolved, that an appraisal of the Torrance property be and hereby is approved to be made by the American Appraisal Company at an estimated cost of between \$5000 and \$6000.

A full discussion followed covering price and wage levels, the possibilities of aluminum drawing equipment and other general subjects.

There being no further business to come before the meet- it was Adjourned.

John H. Dyett, Secretary.

[fol. 4926] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 57

Mr. A. D. R. Fraser

To: Mr. H. T. Dyett  
From: R. A. Schatzel  
Date: July 5, 1951  
Subject: Aluminum

It is estimated that with the completion of facilities now under construction the ingot supply of aluminum in the United States and Canada will be approximately doubled during 1952. Further aluminum expansion by Aluminum Company of America at Wenatchee, Washington, 170 million pound Reduction plant at a cost of 40 million dollars is now decided on. In British Columbia at Kitimat an additional 220 million pounds annually at a cost of 160 million and a 45 million dollar Reduction Plant in Quebec will all tremendously and nearly triple present capacity in the next four years. This will all be reasonably low cost production.

The outlook for aluminum is that even with all wartime requirements there will be a surplus of aluminum for civilian use. Processing facilities to handle this will, no doubt, lag behind the primary supply, but this also is being greatly added to by Alcoa, Kaiser, Reynolds and U.S. Aluminum. The latter three with the aid of Government funds.

There is no need for review of Copper. Richer ore supplies are being depleted. Expanded industrial requirements world wide make a constant demand for more metal. Higher prices and a diminishing supply are probable. The trend of Aluminum and Copper are opposite each other. The spread in price between the two will be continually more favorable to aluminum.

There is a natural reluctance to the use of aluminum in the Wire industry. This is because of lower strength, lower conductivity, and consequently larger dimension—difficulty in soldering and difficulty in terminating. Despite these inherent disadvantages aluminum with steel reinforcing has captured the field of bare transmission conductors for medium and high voltage. There were many problems of terminating, vibration fatigue, etc. to overcome. But these

have been overcome in addition to the engineers' aversion. Except along seacoast areas where salt spray is particularly severe ACSR is the standard high voltage bare transmission conductor. About 75% of the total conductor miles 33000 volts and over were aluminum. It is probably higher now.

For insulated conductors Aluminum still has many hurdles and its inherent disadvantages are more formidable so that in some fields it is doubtful that it will ever be used except in an emergency by Government decree, as in Germany during the last war. These we can rule out of any present consideration. They are, Magnet wire, flexible cords, appliance wiring, flexible cables of all sizes. There are other fields of insulated conductors where the use of insulated [fol. 4927] aluminum conductors are of very doubtful possibility.

Building wire sizes 6 and smaller. Here, even if a very large price saving were (and is) possible, aluminum is not a good substitute for copper. To overcome weakness of strength the conductors must be used hard. They are therefore stiff, subject to fatigue and crack on bending if kinked. They are used by unskilled workmen and dangerous to safety. When installed the surface oxide is highly insulating and leads to a high resistance and unsatisfactory service. New methods may possibly be found to overcome some of the present deficiencies, but I do not feel it a good bet that all will be overcome.

Weatherproof H.D. Aluminum in sizes #1 and larger—here strength does not permit the same pole spacing as copper. It is doubtful if the differential in price would make up for the added labor and pole cost for closer pole spacing.

Insulated conductors generally installed in raceways, ducts, and similar confined space. Space is a valuable attribute and asset in design. In most cases replacements are being made to get more copper in the same space through improved insulations, design, etc. The use of aluminum is therefore quite uneconomical even if technically permissible.

Aluminum has a field which we believe needs only the economic impetus of price differential which we believe is now under way.

Weatherproof—Hard-drawn aluminum in sizes up to and

including #2 which is equivalent to #4 AWG. Copper. This includes all the present contractors weatherproof sizes and a large volume of utility requirements. There are no serious problems to be overcome here, but there is a natural aversion. Aluminum is considered inferior to copper; gangs are used to working copper. The growth will probably need time and additional economic incentive.

ACSR—Bare Transmission conductors—need no comment—they are already accepted.

ACSR—Weatherproof in sizes 2 and larger. The present price differential, I believe, still favors copper generally. [fol. 4928] Special equipment is required and care in joining aluminum to copper. Insulation may be of any type—braid, knit, polyethylene or Neoprene again a question largely of economics on which we would be on polyethylene.

Building wire in sizes #1 and larger where professional electricians are traveling, and equipped with proper tools for pressure connectors and terminating methods.

Underground cable in voltages up to 5000 volts and sizes #1 and larger. This is a range where utility crews are trained and always installed with proper supervision. The danger is that over-enthusiastic advocates of aluminum, such as at present characterize Kaiser efforts, will preach its use in smaller sizes and consequent troubles condemn its use over the entire range. Some of this has already happened.

U.S. Rubber, Okonite, Crescent, General Cable, Collyer, and perhaps a few others have sold aluminum building wire. Okonite have done a good job and wired up several large installations at Indianapolis and other locations for Aluminum Co. of America. These are going good and giving good service. U.S. Rubber's experience is the opposite.

Self-Supporting Service Drop Cable. This is a construction we pioneered in copper. This is an ideal application for insulated aluminum conductor with hard-drawn copper, Copperweld, ACSR messenger. Page 72 of "Electrical West" for May describes an installation of this kind in Portland, Oregon. Conductors were supplied by Kaiser; the messenger is of galvanized steel. The conductors insulated with polyethylene. One of our best customers for copper Triplex has been Detroit Edison. Their studies indicate the possibility of saving 20 to 40% using aluminum.



We, as well as Anaconda, General Cable and Kaiser are supplying 100,000 ft. to Detroit. They also estimate they can realize a saving of \$160,000. per year by using 1/0 aluminum Neoprene insulated line wire in place of #2 copper we have been supplying. This also we will need to share now with Kaiser. We are prepared to supply.

Many engineers have investigated Self-Supporting Service Drop, and are prepared to accept it. Some are investigating Self-Supporting insulated Aluminum for secondary and there is no reason to believe this will not be accepted. In [fol. 4929] sulated aluminum conductor for open line wire has been used and accepted, particularly in the South and West. Some go so far as to say that there is no need to use copper for any aerial use. I do not believe such a generalization can be justified at this time, but that it will grow, cannot be doubted.

We would not recommend pushing aluminum at the expense of copper, but that we be prepared to supply our customer if aluminum does continue to grow in favor as we believe it will.

R. A. Schatzel.

RAS P

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[fol. 4930] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 60

C. H. Ellis  
R. M. Fraser

October 2, 1951

Aluminum Project

The estimated cost of capital items under the project of casting, rolling, and drawing aluminum is \$283,530.00. This is made up of the items in the attached list. There may be a few expense items such as lighting and ventilating changes but they will be of a minor character.

The main items of equipment are the Ajax melting and pouring furnace with a capacity of 2000# per hour; the Properzi casting wheel and rolls; a 10 die Vaughn drawing



machine. This machine is recommended in spite of the fact that the total cost of the project including it is \$8,589.00 more than a similar list including a drawing machine of the Southern Electrical type.

The matter of delivery requires further attention but at present the indications are that the delivery of the Vaughn machine would be no later than transformer and switch gear which are necessary.

Another reason that the Vaughn machine is brought in line is the thought that casting, rolling and drawing can be made a continuous operation. This would necessitate increasing the speed, and hence the size of motor of the "Southern" machine.

An accumulator would be installed between the rolls and the drawing machine—thus eliminating coiling, handling, and welding operations, and a DC drive would be substituted for AC. It would also be necessary to install a second spooler with drive. The estimated annual savings in labor by making the operation continuous and on the basis of a 5-day week is \$46,000.00.

Two 2300 V breaker cubicles will be required at the main substation, and a 1000 KVA transformer and necessary 2300 and 440 V switch gear will be required for this department. It is suggested that this unit substation be installed in the space now occupied by the Bare Wire Inspection and Testing, which would be moved to a new mezzanine over the rod storage area.

The equipment would be located in Building #19 between the Bare Wire mill and Shipping room, and for about three-fifths of the length of that building the floor would have to be level. It is also proposed to compensate in a small degree for the loss of this area to copper storage and shipping by enclosing the open areas between the Machine Shop and the Shipping building.

While not a part of this project—it seems desirable while building alterations are being made to replace the Easterly and Southerly walls of the locker room in the Machine Shop with the customary tile partitions. The Northerly wall of the Machine Shop would under the above plans be located on the line of the Northerly wall of Building #16, and this

would provide the Machine Shop with a 50% increase in locker space, which is badly needed, and would also correct the dingy appearance of the present facilities. The estimated cost is \$2,700.00.

R. M. Fraser.

RMF k  
Encl

[fol. 4931]

Aluminum Project—Estimate of Cost  
October 1, 1951

With "Southern" Machine With Vaughn Machine

Equipment Items		Delivery		Delivery
Furnaces and Rolls.....	\$125,000	6 mos	\$125,000	6 mos
Drawing Machine—200 HP.....	65,000			
250 HP.....			77,250	12 "
Dip System.....	5,000		5,000	
2 Cubicles, main Sub-station..	10,000	10 "	10,000	10 "
1-1000 KVA Transformer and gear.....	20,000	14 "	20,000	14 "
Micro welder.....	1,000		1,000	
Fork truck.....	3,000		3,000	
Sub-total.....	229,000		241,250	
For continuous operation Add:				
Increase 200 to 250 HP.....	5,353		0	
Accumulator.....	4,000		4,000	
Additional spooler and drive..	9,500		11,192	
DC and AC drive.....	6,838	8 "	6,838	8 "
	254,691		263,280	
Deduct				
Fork truck.....	3,000		3,000	
	251,691		260,280	
Vaughn over Southern \$8,539				
Building items:				
Leveling floor, Bldg. 19.....	2,500		2,500	
Meszanine for B.W. Testing..	6,500		6,500	
Bldg. 19 Extension.....	14,250		14,250	
	\$274,041		\$283,530	

Estimated annual savings in labor by continuous method and on 5-day week basis—\$46,000.

[fol. 4932] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 61

Engineering and Research Conference, October 4, 1951  
R. A. Schatzel, Conducting

A guided tour was taken through the Laboratory in the morning prior to the formal engineering session. A varied and interesting display of samples were exhibited and a series of demonstrations were presented by the Laboratory personnel to illustrate test equipment and methods used in development work. Much interest was shown by the outside sales personnel in the attractive sample board that had been prepared by Mr. Mitrovich of our Portland sales office. In addition, exhibits prepared by the Laboratory of aluminum wire, spiral four cables, and numerous insulated cables completely illustrated Rome Cable Corporation's determination to keep pace with the latest development in the wire and cable field. The most spectacular highlight of the tour was the electrical laboratories high voltage demonstration which established conclusively the desirability of shielding high voltage power cables. Following the tour R. A. Schatzel opened the meeting and welcomed all those present.

R. A. Schatzel

Since our last meeting we have had several organizational changes. At the present time Mark Wolf is concentrating his efforts as Technical Manager of the Spiral Four Program. At the same time Mark is continuing his contact with some of our special accounts such as I.B.M., Westinghouse and Allis Chalmers. George Acock has been added to our Engineering Staff as a Product Engineer who will assist in field contacts. In addition George will continue his work with I.P.C.E.A. and N.E.M.A. At the present time it is expected that he will make most of his field trips in the Southern and Central New York territory.

Mert Williams is heading the Engineering Standards and Specifications section. John Hayes, Lew Selden and Mike Kopchik are working with Mert. In addition to working with the Engineering Standards and Specifications, Lew

Selden is taking over the Underwriters' Laboratories contact work.

I would like to emphasize that our past success and continuing success is the end result of team work between the Sales, Production, Laboratory and Engineering. In addition to strengthening the Engineering organization, we expect to strengthen the Laboratory and development work on new products.

The rubber crisis is over because we feel natural rubber is not as necessary as before due to the fact that we now have an adequate supply of synthetic rubber. In many cases synthetic rubbers are equal to or superior to natural rubbers; in most applications where natural rubber still has some advantage there are synthetic rubbers that can be used as a satisfactory substitute. At the present time the synthetic rubber industry is producing 80,000 tons of GRS rubber per month. This breaks down to 54,000 tons of "cold" rubber, 18,000 tons of "hot" and 8,000 tons of "Arctic" and other special Polymers.

#### [fol. 4933] Butyl

Butyl rubber is still in short supply. At the present time two plants are producing 5,700 tons a month. Two more plants are being built by the government to produce an additional amount up to 10,000 tons per month. Therefore, it is expected that the supply of Butyl for electrical insulation will increase greatly in the next six months. At the present time we are supplying low voltage Butyl for Navy contracts. We are working on a high temperature, low voltage Butyl rubber that we expect will in a large measure replace Varnished Cambrie insulation. I.P.C.E.A. and A.S. T.M. are working on specifications for 80 C-Butyl insulation. It should be emphasized that even though high voltage Butyl insulation costs less than RoZone, Butyl is not generally available today. Therefore, you should strive to have customers specifications and inquiries specify RoZone for the preferred insulation with Butyl, when they wish to consider it, as an alternate insulation.

A recent government order allows the broadened use of natural rubber, however, it still is not allowed for insulation under 2,000 volts, except for control and signal appli-



cations. The particular difficulty is that there has been no increase in allocations of natural rubber. Under present international conditions, natural rubber is simply a political and economic football and, therefore, is not a stable commodity.

Our present stock pile of natural rubber is approximately 900,000 tons. It is estimated that we would need 1,000,000 tons to carry on a five year war. Some of the European nations are concerned regarding the effect of our stock piling of natural rubber on world price stability, and economics.

At the present time the transplanting of the rubber trees in South America is progressing satisfactorily because they appear on the way to overcome the blight that has retarded rubber production there for many years.

To show the limited amount of natural rubber that is actually available for consumption, in 1950 this country consumed 395,007 tons in seven months. During the same seven months of 1951 our natural rubber consumption was 245,688 tons. Since our imports of natural rubber during these same months of 1951 were 395,684 tons, our rubber stock pile was increased 150,000 tons. It is expected that even less natural rubber will be available for consumption from now on. At the present time natural rubber costs twice as much as GRS.

To highlight the precarious conditions under which natural rubber is being produced today a recent letter from Malaya written during the first week of this month states that an inspection visit to a plantation was made in armor plated cars under the protection of a private Army. This convoy was subjected to continual harassment by local bandits.

### Aluminum

On the question of aluminum we are taking a realistic approach. We do not intend to follow either these fanatics who would completely replace copper for all uses, or those who would oppose the use of aluminum where it is entirely [fot. 4934] satisfactory. We shall evaluate the proposed application and make recommendations in agreement with sound technical and practical consideration. In this con-



sideration we should remember that the properties of aluminum have not changed with respect to its electrical and physical characteristics. The differences that make aluminum such an important metal to us at the present time are first, economy; second, availability. Copper is still the best metal for electrical purposes when it is available at a reasonable price. For a long term swing, we expect that aluminum will replace copper only in places where copper is not really necessary. Present planned increase in aluminum production calls for double ingot capacity by 1952 and triple ingot capacity by 1954. This change over will occur just as ACSR replaced copper for overhead bare transmission lines long ago. In the immediate future we expect the use of aluminum, in place of copper, for weatherproof, self-supporting aerial cable and triplex service drop cable will continue to grow rapidly. The next field for aluminum substitution will be in underground applications, where space is not a major limitation. In the next year or two it is probable that the decision regarding the use of aluminum or copper will go out of engineering hands in many cases. It is expected that many utilities will swing over to aluminum on the basis of executive decisions, owing to the economic advantages it presents. In most cases the change over will be on a 100% basis for a particular application.

We are actively producing increased quantities of insulated aluminum conductors. You can help us by sending in all facts and rumors. We will investigate, corollate, and then pass back to you the facts. At the present time some companies are using aluminum in enamel magnet wire, but we do not think aluminum has a permanent place in this application. For some types of magnet wire it may well have an important and permanent place.

### RoZone

During the past year we have had considerable experience with 15,000 volt cables insulated with RoZone. We expect there will be no change in our present voltage limits. We do expect that the use of 15,000 volt RoZone insulated cables will increase.

## Shielding

We will recommend unshielded power cable from 2001 V to 3000 V. Above 3000 V we will recommend power cables with insulation shielding in accordance with our Catalog. We are willing to quote without insulation shielding on 3001 V to 5000 V power cables where customer or industry experience has proven such cable satisfactory.

All non-metallic sheathed power cable above 5000 V will be furnished with shielded insulation, unless single conductor cable on insulators.

All inquiries for semi-conducting tape should be referred to the Engineering Department. Although some members in the industry are using a semi-conducting tape as strand shielding at 3,000 volts and above, we do not recommend strand shielding until the voltage exceeds 5,000 V.

## [fol. 4935] Polyethylene

There will be an international symposium at Cleveland this month at the A.I.E.E. meeting on the use of Polyethylene. Following this meeting it is expected that industry specifications will be developed for Polyethylene as electrical insulation and other uses on wire and cable, for example, weatherproof covering on line wire. We say that Polyethylene is an excellent insulation for control, signal, street lighting and some special high voltage power cable applications, such as the 15 KV Union Carbide application. The Union Carbide installation will develop a service record for high voltage power use. At the present time this is the only 15 KV Polyethylene insulated power cable that we have manufactured and we will not make any general recommendation for this use until further experience is obtained.

## Equipment

### Continuous Lead Press

We have purchased a new continuous lead press that should be in operation before the end of next year. The actual O.D. limits that this equipment will enable us to manufacture on Rome 60 cables will be given to you at a later date. It is expected that this continuous lead press

will give us an improved product and put us in a better competitive position.

### Shielding Tape

We have installed a new machine for applying bedding tapes, tinned copper shielding tape, and rubber filled tape in one operation on shielded cables. We expect an increase in the demand for shielded cable at voltages as low as 3 KV.

### Cabling Machine

We have purchased a new cabling machine that will enable us to cable a greater number of conductors in multi-conductor control cable.

### Miscellaneous

The quality of our product this year has been higher than any previous year. This is attributable to the excellent team work between the Production, Engineering and Laboratory personnel. Although the number of complaints have been very few the past year, we consider any complaint serious, especially since copper is in such short supply at the present time and customers are reluctant to return materials under present conditions. Constructive complaints can be very helpful. By that I mean complaints that give a complete description and include samples and any other pertinent information that may be available. For example: Is this the first time we have furnished the wire to this customer? Has the customer changed the installation conditions before or after installation of the wire? Did the customer receive satisfactory service from the pre-[fol. 4936]vious use of our wire or perhaps from another manufacturer's wire? Two recent examples of very constructive complaints which enabled us to improve our product were turned in by Jack Woods and Jack Guyer.

Bob Graham will discuss in detail our activities with Ro-Zone. Ro-Zone has received increased acceptance by engineering firms and utilities and other important users. Sargent & Lundy, and Stone & Webster are recent engineering firms that have approved Ro-Zone and put Rome Cable on their recommended list. This helps all districts. Stone & Webster have given us this approval without meeting their usual requirement of either a ten year service record or a

ten year guarantee. This acceptance is another illustration of consumers faith in Rome Cable products.

As stated before, we expect to strengthen Engineering and Laboratory to broaden our research and information on our products. We must be prepared both in quality and cost to meet any situation—whether it is in material development or design.

With the introduction of aluminum we will eventually need to expand engineering services to develop installation technique.

This introduces the possibility of a whole new line of products, and a new book of questions. This, we expect, will be your and our concern during the next year and for many years to come.

Maintaining our present team work between Sales, Production, Laboratory and Engineering will enable us to improve our favored position in the industry.

[fol. 4937] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 63

Date: October 17, 1951

To: Mr. F. S. Marks

From: Mr. G. E. Rolston

CC: Mr. L. E. Wells, Mr. A. D. R. Fraser

Subject: Westinghouse Electric Corp. Sharon Plant

In order that you may be informed of developments up to date in connection with request from above to quote prices and general information concerning bare rectangular aluminum wire and glass covered rectangular aluminum wire, I have assembled all of the information in this memorandum.

1. The first request covering the entire subject is covered by a letter from Charles Duffy to A. D. R. Fraser dated October 4, 1951.

2. My first conversation is covered by memo to A. D. R. Fraser dated October 9, 1951.

3. I have had costs figured on six sizes of rectangular bare aluminum. These are covered by cost cards 00741, to 00746 incl.

4. I have secured published price information from Aluminum Co. of America and Reynolds Metals. The Kaiser Aluminum Co. stated that they did not make this product.

5. Following are the prices of the Aluminum Co. and Reynolds:

Size	Alcoa	Reynolds
.081 x 204	535¢ lb.	51¢ lb.
.091 x 410	51	51
102 x 410	48	48
114 x 410	48	48
129 x 410	48	48
144 x 325	48	48
Plus .01 for Annealing Quantity Extras for each size ordered		Plus .01 for Annealing Quantity Extras not known
1000- 2000 plus .03		
2001- 5000 " .02		
5001-10000 " .01		
10001-30000 " .005		

6. Following are the prices I quoted and our manufacturing costs:

Size	Price	Cost	
.081 x 204	52¢	36.4	Includes Annealing delivered to Sharon on 24 x 6 spools containing 65-75 lbs.
.091 x 410	52¢	37.4	
.102 x 410	49¢	35.7	
.114 x 410	49¢	35.6	
(fol. 4938)			
.129 x 410	49¢	35.4	
.144 x 325	49¢	35.6	

No quantity adders but minimum quantity per size of 1,000 lbs.

7. The prices quoted on the glass covered wire are listed opposite each item in the letter of October 4.

8. These prices were arrived at by the following method which I have been told is filed with the OPS.

- Figure the selling price of the size required using copper conductor.
- Subtract the price of bar copper (.245).
- Multiply the difference by 3.3.
- Add the price of aluminum ingot. (.195)

This gives the price of the size in aluminum conductor.



9. This formula was spot checked on an actual cost computation and found to be correct.

10. Mr. Duffy was told that these prices were believed to be conservative and he agreed to re-check with us after he had a chance to review with his people.

11. All papers are included in a folder marked:

"Westinghouse—Sharon—Rect. Alum."

Very truly yours, G. E. R.

GER:he

[fol. 4939] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 67

Aluminum Meeting Held November 29, 1951

A meeting was held on November 29, 1951 at 10:00 A.M. There were present: Messrs. A. D. R. Fraser, C. H. Ellis, R. A. Schatzel, G. E. Rolston, J. C. Ward and J. H. Dyett.

Mr. Ward presented his notes covering the meeting with Messrs. Properzi and Nichols on November 28th. He advised that EC aluminum should be annealed. Rolston replied that the rod must be annealed before drawing. In Schatzel's opinion this is guessing on the part of Nichols. Conductivity will first show up in physical properties. Fraser emphasized that Nichols had had little experience in conductors. Rolston didn't believe we will have much leeway in conductivity standards in respect to Westinghouse Transformer even if American standards were relaxed. In Schatzel's opinion we can use both S2 and EC ingots. On the S2 we can get 59% conductivity which would be okay for some items if the standard is reduced. It was pointed out that S2 production is what is being increased in this country. Schatzel stated that you could not tell the difference in installation between 59 and 60½% conductivity. Ellis thought that perhaps Westinghouse specifications should have enough leeway to provide for this. Schatzel didn't believe this was possible on magnet wire although it might be on building wire and service drop. Paper cable, however, requires even better conductivity than the present EC. Customers will begin to specify what

they want. According to Rolston, Kaiser only has one pot line on EC—in Tacoma. He couldn't find out if or what would be expansion of EC in this country. Schatzel reported that all chemical analysis had been taken out of ASTM. In Europe they are using about 54% conductivity but this cable has better physical properties. In his opinion we would gain in this country if went to this percentage. We don't use the same type of copper for different uses; therefore, why should we use the same type aluminum?

Fraser requested that Schatzel get the names of the eight installations of Properzi equipment in Europe—particularly those three interested in conductivity. He went on to [fol. 4940] state that the government feels lead can be saved by not covering aluminum in paper cable.

In respect to speeds Schatzel advised that the contract guarantees a speed of 1200 pounds an hour. According to J.H.D. the press release on Properzi mentioned production of about a ton an hour. Sprackling of Anaconda had estimated about half that production or about 500,000 pounds a month capacity. Both Ellis and Schatzel thought that on speeds we wouldn't reduce our estimates yet. They propose that we see what can be done in Davenport and where we think we can improve.

Schatzel explained that in Davenport they wanted rapid cooling since did not desire a long plastic area, consequently, the need for a smaller cross section. Fraser advised that everything points to the equipment not being too well engineered. He suggested that we get busy on possible improvements before it is delivered. He suggested the possibility of Steele working on the equipment. Ellis agreed he would be excellent for gadgets and refinements while Fidler would be assigned for long range developments. Schatzel suggested that we might employ a metallurgist for aluminum and that we should make a study of furnace linings. Tama of Ajax had reported that we would have no trouble with the furnace. Friends of Fraser's at Norton might be of some help on any furnace problems. According to Fraser, we have experienced a power reduction unit cost of 6% because of Spiral 4. Although in order to get away from gas, electrical heating for annealing had been tried and found wanting, study should be made on aluminum although Ellis doubted its practicality.

Fraser requested a report from Ward on Aluminum and what the equipment will do. In Schatzel's opinion the equipment will cast aluminum and most likely EC, but many refinements are needed.

Fraser asked several questions covering the projected production as agreed above, limitations on drawing, contacts as to sources of aluminum, where we can purchase and first quarter allocations. He also wanted any suggestions on how we can arrange for second quarter aluminum allocation before the December 11th Wire Industry Ad-[fol. 4941] visory Committee meeting. In his opinion starting with the month of April we should submit information on orders on our books as we do for copper.

Schatzel reported that Nichols had indicated he might make an arrangement with us to run the ingot aluminum in second quarter so that we could get experience. This would be feasible only if we can draw the wire. If Westinghouse gets 150,000 pounds will come to us in the form of rods from Alcoa with breakdown to be performed on our bull block. In response to Fraser's statement that we did not wish to buy all our aluminum from Southern if can get service from any other source, Rolston stated that Aluminum is not living up to its promises at least on rods. He did not know about its wire customers. It was Fraser's thought that we skip Kaiser this quarter but a contact should be set up by the Purchasing Department. When our allocation is received for the first quarter it was decided that Fraser, Rolston and Dyett decide how it should be obtained with the thought that we would cover present orders with Southern and leave a balance for discussion with Alcoa if possible. Dyett was to ask Williams once more to request prices on rods, solid and stranded bare, from Alcoa.

Fraser requested that Ward get from each of the group what wire and brass mill products would continue as aluminum when copper was more plentiful. Schatzel explained that with a continuing economic advantage the following products would find use for aluminum—service drop, some service entrance, large size of building wires and power cables, (not paper, but such as aerial, industrial plant and utility needs). Aluminum won't replace copper in all building wires or in any place where ducts or space limitation.

He was amazed with what Germany had done with aluminum but its use had never gone below size #22. He described the use of #20 copperweld in cords for electrical drills, etc., (not yet approved). We are drawing some samples at present and a visit to Oswego is planned where small sizes of Copperweld are being drawn and annealed. Rolston explained that we have run into trouble when drawing aluminum down to #24. Therefore, there is a [fol. 4942] problem for small electronic devices as seven strands are needed. Since no carbon copperweld available there is as much strength in size #30 as we get in size #22 copper. We are at present drawing size #14 copperweld down to #30. Any purchases of copperweld will be taken out of our copper allocation. Schatzel said we are getting electro-plated samples from Kenmore. It was agreed that the field for fine wire aluminum was very poor.

A general discussion followed as to the future availability of copper as opposed to aluminum. Dyett was to check with the copper producers as to what copper might be available for next five years. The vast expansion of certain industries was covered although a change in economic conditions could rapidly alter the availability of metals. Ward was asked to check with Scovill and Chase Brass as to what their opinion is on items in their business that will stay in aluminum. Schatzel brought out the use of lead-steel on plastic water pipe instead of copper.

In line with Ward's study he will consider other products than wire that might fit into our aluminum production. Among other products nails were mentioned. Some 850,000 tons of steel a year are used in the production of nails, which illustrates a large market. At present aluminum nails are not available locally. Before we make any decision on other products, however, we must determine whether we have enough capacity with one machine for products outside the wire field. There might be some uses for aluminum in Torrance such as irrigation pipe. In respect to Polyethylene on EMT Schatzel mentioned that it looked expensive but there might be other uses. Rolston could not understand why Polyvinyl had not been used.

Rolston warned that we must have our program set shortly, so that our fabricators won't think of buying Properzi equipment. He mentioned crazy prices on aluminum



wire at present. In respect to these Fraser stated that before we have our own equipment installed our costs will vary three or four cents higher than after we are operating from the ingot. We might suffer cost-wise until that time. [fol. 4943] Schatzel wished to develop what we would do on a near and long term basis in aluminum with special emphasis on products outside the wire field. In Rolston's opinion if we go into ACSR we will be involved in considerable testing equipment. Southern Electrical has a 50 foot bent plate, and the estimated cost of a straight tensile tester would be \$18,000. He emphasized it would be difficult to have testing done outside. However, Schatzel did not think the testing program was too difficult with the exception of long test for the government which he also believes can be done quite simply. Fraser queried who our customers would be. It was Rolston's thought that we could go as far as Virginia competitively on ACSR. The biggest ACSR use is about 13,000,000 feet a month. Ellis mentioned that 500,000 feet a month for us shouldn't be too large, but Rolston pointed out the difficulty of getting 4% of total sales in the country shipped from Rome. He mentioned that American Gas and Electric (60% of the utility business in Ohio as well as other mid-western states including West Virginia) is the greatest exponent of aluminum.

Fraser thought that counting on 1,000,000 pounds of insulated aluminum a month was too much. After deciding how much should go into this type we should then check the fabricators, then nearby utilities and finally such products as nails. He emphasized that we should remember one of the things in favor of the Properzi equipment was the ease with which it could be moved. As a reply to his statement that he doubted that we would get 1,000,000 pounds per month both Schatzel and Ellis restated that this production should be realized in a year's time. After discussion between Fraser and Rolston it was the decision that the following breakdown of our sales on a monthly basis might be as follows:

150,000 pounds a month for fabricators  
 (if not all in the form of bare wire  
 might sell some rods) .  
 75,000 pounds Westinghouse



400,000 pounds ACSR

[fol. 4944] 375,000 pounds insulated products  
(equivalent of about 800,000 pounds in copper)

In anticipation of production of ACSR consideration was given to stranding equipment. Schatzel outlined a study should be made of where we would put new stranding equipment and whether the old building on Madison Street would suffice. Ellis rejoined that we were making a study of which way the plant operations should run—in which direction material would flow. A study is also being made of handling costs under varying schemes. Rolston pointed out that more stranding would be necessary in aluminum wire than in copper since the use of larger cables is necessary. Fraser asked him to make a special study of this although Rolston is not in a position yet to tell change-over sizes. Ellis will request Bob Fraser starting an equipment review. In respect to this Rolston did not think that we could produce satisfactory ACSR in the larger sizes on a rigid frame strander since we have experienced trouble on hard copper. Fraser answered that Southern had a 61 strand rigid type strander in 1948 but may have a new different type strander. (In checking with R. M. Fraser discovered that the second strander was also the rigid type.) Tessmann has gone as high as 4,000,000 pounds of aluminum a month. He believes that New England is a good territory for ACSR.

Rolston reported that most companies have given up promoting aluminum in small solid wires in the building field but will continue to promote six stranded and larger in this same field. Fraser recommended that stranding and testing are problems to be turned over to Ellis. Rolston did not anticipate any difficulty in getting rating assistance for any new equipment. Fittings must be lined up if we go into ACSR according to Schatzel who thought that Alcoa and Bundy would supply.

Rolston emphasized the seriousness of what scrap had done to our cost estimates on aluminum. We should devise means of saving insulated scrap since at present the aluminum melts in our scrapping process. Dyett reported that some of this aluminum insulated scrap had been sent to American Metal to see what could be done at the refinery. Rolston reported that the waste totaled about 6%. Schatzel

stated that we could re-use any scrap material which the Properzi equipment produced.

[fol. 4945] In addition to Westinghouse Rolston thought that our other transformer customers would be forced to aluminum. He could not see us in automotive wire field. At present aluminum is being used in starter cable.

In the non-electrical use field (or cold-headed products) are nails, machine screws and rivet wires which would bring us into the problem of alloys. This alloy situation, according to WARD, would present us with the problem of more melting diversity. There would be a question of emptying the furnace. Rolston said that most of the non-electrical uses would be from S2. Schatzel outlined the possibility of using the first Properzi for electrical purposes and another for non-electrical.

Schatzel wondered whether the production of nails is a good field. There might be a potential of 50,000 tons of aluminum a year based on galvanized steel nails. Ward advised that airplane rivets is a cyclical business as is true of the nail market which is both highly cyclical and competitive. If we serviced a nail manufacturer it would have to be largely on the basis of our location. He wouldn't state whether or not it might be interesting to us without making a survey. Schatzel posed the question of what we would do if we had a second Properzi furnace in another location with its extra capacity in the event that we only needed part of it for electrical. Fraser emphasized that we were looking for something in this non-electrical use which could help us in poor times.

Schatzel brought out the subject of pipe. We would start with ingot, melt and then process. It might resolve around buying aluminum pelletized which would not be connected with the Properzi method. Ward brought out the question of small piping in various types of equipment as well as whether or not plastic could compete with aluminum or copper tubing. In Schatzel's opinion these two latter types are expensive. Ellis mentioned that Nichols' business was mostly in clothes line which sold extensively in his territory. However, Schatzel did not think much of this type clothes line. Ellis mentioned the possibility of manufacturing [fol. 4946] ing stock pins for electric furnaces since they stand up better than galvanized steel.

[fol. 4947] IN UNITED STATES DISTRICT COURT

## PLAINTIFF'S EXHIBIT 68

## Aluminum Meeting Held January 4, 1952

A meeting was held on January 4, 1952. There were present: Messrs. A. D. R. Fraser, C. H. Ellis, G. E. Rolston, R. A. Schatzel and J. H. Dyett.

Mr. Fraser called the meeting for the purpose of determining from whom we should do our ordering, what the supply situation might be on aluminum, what trips should be planned and any other near term angles. In respect to the equipment (\$336,000. approved to date on E.R.'s) Ellis advised that the furnace had been promised for May and should be ready by July while the Properzi equipment should be available at the same time having been promised in April. Schatzel reported that Properzi had been running about 30 days late on deliveries. He had been told this by Mr. Hagan of General Cable who also advised that his company had purchased four Lindbergs rather than the Ajax. On furnace linings he didn't see any cause for worry, a result of the testing at Nichols.

Ellis discussed moving the elevator supply and the attendant equipment from Reliance should be available in August. It should be remembered that the 250 h.p. motor comes from Electric Machinery in St. Paul. Vaughn's spooler has been promised for August. In respect to power, Westinghouse has given an August promise but we can experiment from present cubicles. The dip system is being made here and the welder situation is satisfactory. Although the main substation is not promised until December we will be in a satisfactory position. The Vaughn 10 die machine is anticipated in October and the motor in December.

A discussion followed of what we could do on copper without production from the Elevator Supply. There is a possibility of using both aluminum and copper on this equipment. Ellis could see three months or so of troublesome operation. Fraser recommended that our Vaughn machine be completely overhauled this summer. He asked Ellis to get out figures of possible production under vari-

ous set-ups. According to Schatzel Nehring flushes out the dip when he changes metals.

[fol. 4948] Fraser queried as to when we should explore the ingot picture. It looked like about the third quarter. We could sell the rod Okonite draws from the rod. Rolston had previously thought of just wire bars. He doesn't know what Simplex program will be as they haven't been active to date, as is also the question of Walker Brothers.

In respect to the first quarter allotment everybody got the same poundage as in the fourth quarter although the list was increased from 16 to 60. Requests were made for 17 million pounds against 6 million pounds available. Fraser believed that there would be an improvement in amount in the second quarter. The important thing is to have orders which we can substantiate. Rolston pointed out that 6 million pounds goes a long way toward the approved utility use. He advised that the aluminum form has to go in on January 15th. He reported that Washington had stated that no use information should be contained in the application letter but he was wary of what the Aluminum Branch would do with insufficient information. Tickets are not available in the field; so it is impossible to get accredited orders. The whole thing is in a mess. We can build up a story of orders—can get. For instance, we could have included all of the 177,000 lbs. of the Public Service program as well as Westinghouse requirements. The Sales Department will also check on Allis Chalmers, Maloney and Kuhlman interests.

J. H. Dyett reported that no delivery information had been received on first quarter from Alcoa. (Satisfactory information giving 'early in the month' shipping promises was received later in the day. The 10,000 lbs. for Westinghouse have also been delivered.) The suggestion that Fraser might check DeKlyn on deliveries was unnecessary as the information was received through Patterson. J. H. Dyett will check to see that the full first quarter allotment is filled. Fraser mentioned that since we were taking the rod and putting it through the bull block for Westinghouse, could we take the rod through the bull block and then to the heavy intermediate while waiting for the full set-up. Ellis replied that we would be doing this on copper rather than aluminum.



[fol. 4949] Rolston reported that we could not get back our aluminum scrap on a returnable basis from American Metal. We should find out from Alcoa and Kaiser as to their interest in replacing our scrap. Schatzel stated that Kaiser was definitely interested and J. H. Dyett will discuss this with their representative when he is next in Rome. Fraser will check this situation with DeKlyn.

Fraser explained the Southern Electrical position. They delivered to us fourth quarter aluminum after which the Aluminum Division issued a directive on Alcoa. Consequently, Southern Electrical was shy 150,000 lbs. and we were unable to get Alcoa to make up this deficiency. Tessmann stated that he did not see how Southern could give us red from one furnace unless we could get him the ingot. J. H. Dyett mentioned that Alcoa did not seem interested in the ingot business since it has excess capacity at Massena for fabricating. A visit to Alcoa is advisable some time in the early spring. Rolston thought that he could get some of the answers to our various problems in Washington. He stated that we would get the aluminum in the form in which it was allocated.

In respect to Les Fittler and Carl Ward going to Nichols Ellis thought that it should be after all equipment is installed. He will write to Nichols to find out when this might be. Schatzel is currently looking for a metallurgist. He will keep him in the Laboratory and train one of our own men for the plant.

Meeting adjourned.

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[fol. 4950] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 69

Aluminum and General Meeting Held January 15, 1952

A meeting was held on January 15, 1952, at 2:00 P. M. There were present: Messrs. A. D. R. Fraser, H. W. Barnard, G. E. Rolston, R. A. Schatzel, J. C. Ward, Jr. and J. H. Dyett.

On ACSR a request for test equipment in the amount of \$45,000 has been submitted. Mr. Fraser advised that the



line up of 1952 capital expenditures would be available when R. M. Fraser returns. He pointed out that there was still Three-Quarter Million Dollars of past programs incomplete.

According to Rolston there is nothing new from his angle on ACSR. He foresaw selling limits of 300 miles from Rome in the states of New York, New Jersey, Pennsylvania, New England States and Ohio, in which latter state Tiffin and Kaiser would be competitors. Ellis and Rolston had yet to discuss the necessary equipment. According to Rolston utility and R. E. A. complete programs total Sixteen Million pounds per month, in view of which during the first year we would be fortunate to get 500,000 pounds of ACSR a month. It looks as though we would not be in ACSR until late 1952 or early 1953. Both Schatzel and Rolston agreed that if we produce One Million pounds of aluminum a month we would need ACSR in our line. Fraser questioned on how our insulated accounts could help. For ACSR business Schatzel stated we would need tensile equipment but our testing requirements would be \$25,000 less as wouldn't need modulus testing. According to Rolston 500,000 pounds a month of ACSR would represent billings of \$225,000. Fraser will pass this information on to Ellis.

Rolston advised that Allen of Anaconda had stated that the Properzi equipment was experimental. They are producing ACSR at Great Falls at the present time. If the Harvey deal works out satisfactorily Anaconda expects to put rolling facilities at Great Falls and then will produce ACSR at Orange, Sycamore and Hastings. In respect to [fol. 4951] this Ward advised that he had received information from the Aluminum Division that Harvey would proceed as scheduled.

Ward advised that Texas had made requests for forging plants and other fabricators. Fraser stated that Texas prospects had been much in H. T. D's and his mind. One or more of our competitors are considering locating there. We should consider possibilities of a base operation in Texas and what the base should be. There is a possibility of a community interest such as Texans taking all Preferred Stock issue and we taking the Common. Ward told of Temco which now has ten thousand employees. Dallas and Fort Worth are now growing at the rate of four times the rest of

the country and an industrial band of plants is growing up between the two cities. This area now has one and one-half million population. There is a great deal of overhead distribution which should make for a large aluminum market. Fraser emphasized that the company who gets there first will benefit, to which Ward agreed as well as that there was money there to invest. Consolidated engineers on the B-26 are not using aluminum. They gave up after six planes as assemblers stretched the wire and Wright Field does not have the proper specification. (The B-36 uses Two Million Dollars of electrical equipment to Two Million Dollars of other materials). Schatzel pointed out that aluminum cuts too easily and a bad situation results when strip. According to Ward engineers receive \$500 if they can save one pound in the weight of a plane. This is a great incentive.

Ward told of his advisory meeting in Washington. This group with forty minimum and ninety maximum in attendance meets once a month for two days and hears the members of the Cabinet, E. C. A., etc. This meeting acquaints business with what's happening and allows business men to give recommendations to the Department of Commerce. The present economic situation was covered very ably by Mr. Lazarus of Federated Stores. He said that if not for the impact of defense we would now be in a recession. At present our economy is on a flat curve. The danger in the [fol. 4952] situation is that Congress has been the watchdog of government expenditure but has now given Eighty Billion Dollars to the Executive Branch, or you might call it a blank check for the Defense Department, which can throw these monies into the pot at any time and add to the inflation or can feed it to the country as it can be absorbed. Since Air has the largest percent of these funds it can raise hob. The danger from heavy inventories at retail has disappeared but manufacturers inventories are dangerous. The public has shown common sense by saving. Mr. Lazarus summed up by saying that subject to a sensible policy of the Defense Department there should be no serious dislocation.

Ward went on to state that steel negotiation is the key to the labor situation. Historically speaking labor lost strike and union was desperate. Demanded the President bail them out. The Labor Board was constituted four, four and four, and its job was just to stabilize. Labor got an agree-

ment to enlarge the Board to six, six and six and to handle grievances in return for election support. Reeve of the Textile Union stated that everything was set and would now strike against the Board as soon as the Board was enlarged. This was highly unethical as he was a member of the Board. The Board has tried to conceal that it is a Labor Board. In Ward's opinion Wilson of General Motors has advanced a bad thesis in recognizing an advance labor trend which he says is inevitable. Too many people appeared confusing his position with his ability.

Fraser pointed out the great mistakes that have been made in government fiscal estimates. General business will be slowly declining but this can be changed by the Defense Department. According to Ward General Marshall was more interested in tools and capacity than in the final product while Lovett is slightly more realistic. We must have skill in picking the right airplane plans for production. Today's tools change as do plans. Lovett believes that the monies of the Defense Department should supplant the economy, that is, the Department should hold business level where it is by the flow of the money under its command. He seems willing to cancel excess capacity and [fol. 4953] orders. Fraser queried whether this would affect our Spiral Four program. Schatzel answered that field wire stocks are being replenished only as they are used but that Spiral Four still should continue since it has hardly been started. Fraser wondered what would happen to field wire suppliers if cut back. Would the government cut down on other business so that this could be spread around among our less fortunate competitors. J. H. Dyett mentioned that the government had just announced a policy of placing business at higher cost with companies in depressed areas. Ward mentioned that this has happened in aircraft.

Fraser reported that our reels with utilities showed a building up of wire stocks. He is sending a letter to our District Managers to get inventory information. What measures should we take in order to protect ourselves? He is getting lists of customers showing copper purchased in 1950 and 1951 and our order backlog projected into 1952. Also our customers total inventories. (This is done through our reel study.)

In Fraser's opinion our ability to get material will some time during this year meet our sales requirements. We are presently looking for companies who have pyramided orders. If we have a controlled amount of material we should pick and choose our customers. Ward advised that there had been hoarding of materials by the automobile companies. Fraser pointed out that General Electric wants to cut its inventory by One Hundred Million Dollars. This may be a warning to other people who may discover the high cost of maintaining inventories through borrowed money. Ward believes that the expansion plans of many big companies may be revised downwards and the government will some time find a plethora of copper. We should study whether or not our equipment is satisfactory for any changes in demand in housing, appliances, etc. Schatzel thought that we must be prepared for plastic powder mixing which will not be a major equipment expense. There is also the question of cold feed development. Is Anaconda ahead of us on this? Schatzel did not think so. He agreed that we might have to accelerate some of our developments. [fol. 4954] In commenting on our California Plant Ward advised that it was an interesting operation, outstanding in neatness and in new equipment. The plant gave the impression of not being crowded and much hand operations have been eliminated. The control of plating is excellent and the flying loop shows much ingenuity. He discovered very rough records and blue prints, but Fraser thought that we had them. Ward was amazed that the Machine Shop could get such good results without being well outfitted. Ward believed that the west coast plant should be digested. If we can secure volume we should have a good return. It is a big investment with small labor costs. According to Schatzel a lot of money has been made in mechanical tubing.



[fol. 4955] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 70

Meeting on Aluminum Program for Rome Cable

Corporation Held January 30, 1952

Present: Messrs. A. D. R. Fraser, R. A. Schatzel, G. E. Rolston, C. H. Ellis, R. M. Fraser, J. H. Dyett and J. C. Ward, Jr.

Ross Fraser opened the meeting by stating that the purpose was to arrive at probable types and quantities and size ranges for aluminum conductors which will probably remain in aluminum indefinitely. He stated that there were five principle objectives for discussion:

1. This refers to the first meeting on the subject and the question, namely, what products in the brass and wire mills will stay with aluminum and if so how many tons of copper will be made available.
2. A report on Bob Fraser's trip to the Hunter Continuous Casting Plant at Riverside, California.
3. How to determine the extra stranding equipment, etc. that may have to be included in the 1952 budget for capital expenditures stemming from aluminum cable in place of copper conductor.
4. Define more accurately the ACSR conductor picture so that Ellis can be certain of his equipment needs by the Board meeting of February 29th.
5. Bring up to date any new or added information that may have been gathered by those present. Note any changes in the forward equipment delivery schedules that would be significant.

Rolston desired to point out that in certain cases when aluminum conductor is substituted for copper the conductor size may be jumped four gauge numbers in place of the usual two. He cited overhead conductors size #8 copper used by West Penn Power that may be considered [fol. 4956] undersize for ice and sag load and that upon switch to aluminum will be required to go up four gauge



sizes. He also pointed out that Westinghouse, for instance, is planning to have all its small motor leads go to aluminum stranded and that in this instance they will probably not change the conductor size due to the small drop realized. No. 14-19 strand is an example. The discussion that ensued focused attention on the fact that as the conductor sizes increase in the larger ranges the strand lay may jump from 19 to 37 or from 37 to 61 thus placing a heavy requirement on the stranding equipment, even though the cable footage is not increased. It will be necessary for Mr. Ellis to estimate this effect.

At this point Ross Fraser called on Bob Fraser to report on his Hunter-Douglas Corporation inspection at the Riverside plant. Bob Fraser reported that Hunter got into the continuous rod casting through heaving about the Properzi process. He was escorted through by their Research Director, Mr. Quadt. Since they had no drawing equipment they have had the Anaconda Orange plant draw down their cast rods and thereby Anaconda had become quite interested and an active collaborator. Their equipment starts with three Ajax electric furnaces apparently lined with normal silica linings. These pour alternately into a holding furnace of the gas reverberatory type. (Note: This may be for the purpose of bringing about a reducing atmosphere.) The holding furnace pours into two troughs each ending in a refractory tip which is believed to be immersed approximately 1" in the fluid metal. Each trough fits into a caterpillar type split mold set-up. The mold sections being short blocks of steel, water cooled. The rate of casting is 6 ft. a minute and the cast ingot (of the type used for venetian blind sections) is sheared into 55 ft. lengths which are fed into a soaking furnace at 1000° F. after which they are hot rolled in eight passes. Cooled water in the mold is 97° F. and each mold block section is fed by a flexible hose attached to a revolving drum in the manner of spokes which revolve with the caterpillar mold. For wire the mold blocks are curved and cast three strands or rods simultaneously. They started with  $\frac{3}{8}$ " rod and when drawn [fol. 4957] to final size the wire lacked sufficient tensile. They then went to  $\frac{1}{2}$ " with a first draft of 40% but the finished .077 wire lacked tensile to meet ACSR requirements. They now plan to cast  $\frac{3}{4}$ " rod and will keep Rome informed

of the progress. They may have to cold roll several passes or pass through a double deck bull block to work the metal. In the case of the venetian blind strip this is rolled to  $\frac{1}{8}$ " thick, the same width as the cast ingot, and then to .008 in a series of "H" stands to finished "blind" stock.

Schatzel: What micro sections have they taken?

Bob Fraser: There were no micros.

Ellis: What is the advantage of the Hunter over the Properzi system?

Bob Fraser: It is a better machine, having been designed and built by the Hunter organization. The pouring conditions are believed to be much better. (Probably due to the ceramic spout and the immersed condition.) In addition, one man handles two machines and each machine will cast three wire rods.

Ross Fraser stated that he felt Schatzel should look at the Hunter process in March while out at the coast meeting.

Bob Fraser: Probably through the ceramic spout there has been no iron pick up by the molten aluminum. Hunter has made no arrangements for licensing as yet although Anaconda who are doing the drawing at Orange are very interested.

Schatzel pointed out that Properzi depends upon a rapid chill for the desired structure and agreed with Rolston that if Hunter is not testing for conductivity he could be fooled by his results, although undoubtedly Anaconda was following this since they were doing the drawing. Schatzel agreed that the mold set up would be more flexible for large flats and rounds and the production of 4600 lbs. per hour is high. He agreed to make both porosity and conductivity tests on the samples Bob Fraser brought back with him.

[fol. 4958] Ellis commented that he liked the idea of casting the rod shape direct and Bob Fraser commented that by casting three wire rods simultaneously they could be fed from each mold set-up onto large reel take-ups and that this has some advantages in speeding up the drawing process. Schatzel pointed out that he knows of no extruded or cast rods successfully drawn without splits along planes of structural weakness. The rolling process in the normal fabrication brings about heterogeneity and thus eliminate the splitting. He pointed out that the extruded rods from

Scovell led to trouble in drawing, probably through lack of homogeneity. Bob Fraser pointed out that there was no splitting of the Hunter rods which drew successfully but did lack tensile. Schatzel commented that the lack of tensile may be due to porosity and this could be detected by micro sections. Rolston stated that Reynolds Aluminum casts a 1" slab and slits it into squares, then passes it through drawing dies into rod sizes, but that the customers do not like Reynolds' rods and report them as lacking in uniformity, thereby supporting Schatzel's comments. Paul Williams confirmed this to a Rome representative very recently in his experience at the Lister Hill plant where they were compelled to use Alcoa, Kaiser and Reynolds rods and the latter were distinctly more troublesome. This concluded the discussion on the Hunter process.

Ross Fraser then suggested that the stranding requirements be discussed. At this point there was an interruption due to a long distance call to Ross Fraser. Upon resumption Ellis asked what should be used for making the stranding requirements estimate—what basic assumption? Rolston pointed out that there will be no more footage used by shifting to aluminum but that the stranding lay-ups will be more complex due to the larger gauge sizes, that Ellis should start with the premise that in building wires, either plastic or rubber, the shift will increase conductor size by two gauges; that is, No. 4 strand for No. 6 strand—but pointed out that No. 8 solid in copper will undoubtedly stay as copper conductor. He feels that branch circuits will remain in copper but that main feeder circuits will swing to aluminum, thus the sizes No. 14 to No. 8 inclusive will stay copper and aluminum will start at No. 4 (No. 6 equivalent [fol. 4959] in copper.). It should be obvious No. 8 in copper will be cheaper than No. 6 in aluminum strand and that the latter size wire, while it will not drop out, will go down in volume. The overall effect will be that much more 37 strand will be used than presently due to the shift from 19 to 37 if the gauge sizes increase in aluminum. Ross Fraser threw out the suggestion that for estimating purposes we may assume, 33% of present copper in appropriate sizes will switch to aluminum. Rolston warned that there would not be any appreciable effect this year due to the lag between the engineering design of systems, placing of the

orders and the delivery of the material. For instance, in the second quarter of this year for the whole country eight million pounds is allocated for aluminum conductor for utilities, one million pounds for electrical equipment manufacturers and five hundred thousand pounds for the construction program. He doubts whether by the fourth quarter there will be more than one million five hundred thousand pounds for all construction for the United States in aluminum conductor. Ross Fraser stated with an 11% cut back in copper allocation for the second quarter the aggressive section of the industry will be forced to make more substitutions for aluminum. Rolston cited as an example for his argument the Utica fifteen million dollar General Electric plant expansion program utilizing \$338,000 of new wire, 245,000 ft. of conductor and 350,000 lbs. of copper and that once this is designed you cannot substitute aluminum for copper because of terminal boxes, conduit sizes, fitting sizes and the like and that such an example indicates why the effect of switching to aluminum will be small in 1952, since deliveries on the Utica project are specified for the third and fourth quarters. Washington advises that they will increase the allowance of aluminum to utilities for overhead distribution primarily other than H-3 and H-4 (utility government classification). If Rome gets the orders they will get the needed aluminum allocation. General Electric should get 25% of the total of one million pounds for electrical manufacturers allotted for the second quarter. Westinghouse have put in a large allocation but many of the electrical manufacturers are inactive [fol. 4960] on this subject. Rolston figures that by 1953 there will be sufficient aluminum available but not in 1952 to get the desired needs. He has instructed Rome Sales to take orders for 250,000 lbs. in aluminum for the second quarter in anticipation of the allotment for which he cannot wait. This will go into Weatherproof and Drop Cable with no triple braid type. The first quarter allocation for Rome is 150,000 lbs. and that as a guess he would expect the third quarter to have upwards of 300,000 lbs. and the fourth quarter 400,000 lbs.

Schatzel pointed out that for reasons previously discussed at earlier meetings there should be no ACSR for Rome in 1952. If the Properzi equipment is available for



the fourth quarter it is conceivable that we would get some requirements and allotments from other fabricators. If we did not, then the 400,000 lbs.-estimated by Rolston would provide less than one-half month's rated capacity operation for the Properzi equipment for the entire fourth quarter.

Ward inquired as to the overall effect of the aluminum plus the copper total poundage on the total mill load. Rolston replied that it will lead to a much higher mill stranding load in all probability. Schatzel quoted from a Consolidated Edison report that was very favorable to their experience on terminals for aluminum distribution network and that this will lead to the use of aluminum as an alternate for copper upon the issuance of the formal report. Schatzel believes this will have an important effect. Rolston warned that if Consolidated Edison uses equivalent resistances in conductors they cannot pull the same number of conductors in their present installed conduit sizes. Schatzel replied that they can on large portions of their system, namely Queens and the outlying sections, and that compression terminals have operated successfully. Rolston answered that economics will govern as the effect of insulation thickness, complexity and cost enters into the conductor picture. It is obvious that the larger aluminum gauge required will run up the installation cost more in proportion as the thickness of insulation and the expense of insulation increases. Schatzel stated that the final report should be made to the A.I.E.E. in March or thereabouts by Consol. Edison.

Rolston stated that Westinghouse is switching their 6-4-3-9 specification from copper to aluminum for motor leads. [fol. 4961] Westinghouse is talking of a five million two hundred thousand pound copper requirement for their corporation per month plus another one million three hundred thousand pounds for their present requirements and that Mr. Henderson of Westinghouse estimates they will need 10,000 tons per month. Rolston points out that by comparison the General Electric Company is using only 6,000 tons per month. Whether these figures are accurate or not they point to the switch to aluminum in any event and this may save money as well. Thus General Electric advises that they can switch 25% of their copper to alumi-



num conductor with no important design changes. Ross Fraser asked if Ellis is satisfied with 500,000 lb. allotment for ACSR per month as a basis for making his equipment analysis. Ellis said he was and would assume that the distribution by size would be similar to the experience of Southern Electric which was available to him. Rolston stated that we must remember 70% of Southern Electric's sales is to R.E.A. In any case he felt that capacity for large 37 and 61 strand conductor will be needed and that we may need one right now for normal growth. Ellis stated that he may not want a 61 wire machine and instead may run the wire through twice to better advantage. He will test his estimate by Southern Electric's practice and will use wire footage capacity by Larmuth machine, perhaps adding new 7 and 12 strand Larmuth type machines. He will proceed on this basis for his estimate.

Ross Fraser pointed out that we were now back to the question as raised in the first meeting and he would like a forecast as to what items in whole or in part will stay as aluminum. He used as an example the new copper clad radiator studies by Henry Ford. Rolston replied by stating that final price has much to do with this answer. He cited as a particularly bad practice General Cable's proposed pricing schedule filed with OPS for aluminum building wires as compared with copper in which General Cable apparently made the price come out for No. 6 RH in copper equal to No. 4 in aluminum even though it is obvious that the No. 4 will cost less. As a further argument against this practice it should be recognized that the purchaser [fol. 4962] will in many cases require larger conduit size and hence his switch to aluminum will increase his costs. Rolston feels that for construction wire where aluminum price savings bring an incentive that there aluminum will stay and this will be in the larger feeder sizes, say, beginning at 1/0. Schatzel commented that this not only will give economy but that in these sizes trained electricians will install the cable and that thereby there will be less resistance to the products involved and less complaints may result. The smaller sizes may at times be indifferently installed and if so aluminum conductor would give trouble and bring about sales resistance. He said he was leaving

out comparisons of a 12¢ per pound copper market as this seemed far off.

Rolston stated that in the case of service drops few fittings are involved and that after a change to aluminum is made it will stick. He feels that in general overhead distribution will go to and will stay in aluminum. The underground situation is quite complex and the use of aluminum will grow but he isn't clear yet to what extent. Schatzel stated that undoubtedly some underground will stay in aluminum in the large sizes. Ward asked about street lighting. Schatzel replied in Polyethelene types aluminum would be appropriate but as to magnet wire this is questionable except the large sizes and flats in aluminum as there should be enough copper for a non-defense economy. Ross Fraser asked who knows how long before the defense economy will be out?

Schatzel said that all insulated aerial cable, in his opinion, will stay as aluminum under normal business conditions, whenever that may be. Ellis asked what about the high cost copper producers who may be forced to go out of production when copper comes down in price? Schatzel felt that they may have to keep the high cost producers in production.

Ross Fraser pointed out that in addition to the type discussed, non-leaded paper cable is claimed to be a market for aluminum conductor. Schatzel answered Ward by stating that he felt no flexible cords or flexible power cables, welding cable, mine cables, etc. will be suitable in aluminum for mechanical reasons.

[fol. 4963] Rolston summarized as follows:

- A. Type ACSR and all overhead primary and secondary conductors down to No. 4 in aluminum will stay as aluminum when aluminum ingot is 19½¢ and copper ingot is 16¢. He takes exception, however, to seacoast areas where aluminum erosion is evident and in other special applications.
- B. That large size underground in sizes No. 1 and heavier will remain aluminum where the installation costs do not offset price advantage.
- C. Magnet wire will stay in copper except during emergencies.

- D. Building wire will stay in aluminum from 1/0 and larger for feeders and will not be used in secondary distribution.
- E. Automotive wire may stay in aluminum if economy proves out but offsetting this is the problem of pressure connectors and automotive servicing which makes this complex and hence doubtful.
- F. Railway requirements will stay in copper and power control cables and signal cables.
- G. Marine wires and cables will probably stay in copper.
- H. Aircraft cable will probably stay in copper as at present.
- I. Power busses will stay in copper for mechanical reasons.

Ross Fraser then asked what the opinion was with respect to brass goods switching to aluminum. Rolston replied that overhead bus duct may be converted to aluminum and that this is a considerable tonnage. In general discussion it was agreed that much building hardware has already switched from brass to aluminum and will undoubtedly stay. That Alclad screen cloth has proven suitable in place of brass and copper and that also plastics have come in. Architectural grills and ornamental work in the construction industry have largely switched to aluminum from brass. Gift shop and novelty lines have in many instances switched to aluminum from brass or copper. The [fol. 4964] automobile industry is substituting other materials for copper and in the case of Ford expect to cut their requirements per car from 42 lbs. to 28 lbs. Ross Fraser pointed out that no doubt Revere could give a better summary of this switch from brass goods to aluminum in a post-war economy.

Meeting adjourned.

Carl Ward.

JCW:AS

[fol. 4965] IN UNITED STATES DISTRICT COURT

## PLAINTIFF'S EXHIBIT 71

March 3, 1952

## Inspection Trip to Rome Cable Co.

*Preface:* Messrs. Plummer & Knouse of A.C.O.A., Pittsburgh, Messrs. Holcomb, Wheeler & Glascock of A.C.O.A., Massena, spent 2 days, Feb. 13 and 14, 1952 at the Rome Cable Plant, Rome, N. Y. This trip was arranged by Mr. M. E. Noyes, A.C.O.A. Product Manager for wire and cable.

*Purpose—*

The general purpose of the trip was to enable A.C.O.A. personnel to gain some knowledge of the insulated or covered wire industry. It has been proposed that A.C.O.A. Massena Works enter the covered wire manufacturing business, specifically to make neoprene covered weather resistant wire and cable and Triplex service drop wire, as well as polyethylene covered weather resistant cable.

Multiple purposes of the trip, in connection with the above general purpose, are as follows—

1. To study the production methods for making the above outlined products.
2. To study operational difficulties of neoprene versus polyethylene extruded covering applications to aluminum wire and cable.
3. To study mechanical and electrical equipment and facilities used in the insulated wire and rubber industry.
4. To determine what technical control problems are involved in the successful production of extruded neoprene and polyethylene wire coverings.
5. To determine temperature effect on physical properties of aluminum in covering processes.

*Personalities—*

During our visit we spent most of our time with the following Rome Cable men—

Mr. Charles Ellis, Works Manager  
 Mr. Rudy A. Schatzel, Product Development Chief  
 Mr. J. Carleton Ward, (Consultant on Aluminum  
 Conductors) (Assumed this to be title)  
 Mr. Robert Frazer, Plant Engineer

[fol. 4966] We believe all these men had in the past worked for General Cable Co. These men extended us every courtesy and answered all questions to our satisfaction. If there was any reserve on the part of any of the men it was, we felt, a natural reaction to a future competitor. If these men tried to influence us in such a way to keep us out of the covered wire business it was certainly in a mild way and no more than we would do in similar circumstances. For example, they did not minimize operational difficulties, which somewhat discouraged us in connection with neoprene. On the other hand, they freely gave us operating speeds, costs of materials and showed us their standard operating procedures.

#### Discussions

*Types of Weather Resistant Wire & Cable*—(Cotton Knitted versus Cotton Braided versus Neoprene versus Polyethylene).

(Mr. Ellis' comments):

In the industry at present over 80% of all weather resistant wire is cotton covered. At one time, all cotton coverings were braided; now most manufacturers prefer to make knitted cotton cover because it is cheaper to make. Many Southern Utilities will probably always specify a cotton cover. If cotton drops in price, practically 100% of weather resistant wire will be cotton covered. The price of basic neoprene is pretty much fixed and stable. Polyethylene in a precompounded form is the most expensive at present—55¢ per pound at .92 gravity and also in short supply because of defense orders. In the next few years polyethylene will become more plentiful and cheaper. Polyethylene is the easiest to apply and makes a better covering, but a covered wire manufacturer for many years to come must be equipped to supply all three coverings. Rome



Cable by the end of 1952 will be doubling their present production of polyethylene covered weather resistant wire.

[fol. 4967] *Problems Confronting a New Manufacturer in Connection with Diversification—*

(Mr. Ellis' comments again).

It will be very hard to draw the line and furnish to the trade only weather resistant and Triplex wire and cable. For example, some Utilities want some rubber in the neoprene mix for Triplex cable—you must give it to them. Triplex specifications vary and the first thing you know you are applying braid and furnishing insulated wire and you will then have to go to pan vulcanizing and will have 600 mixes of covering compounds and 375,000 different products like Rome Cable makes. We told Mr. Ellis we hoped to avoid such pitfalls—he wished us luck.

*Hot Process Neoprene versus Room Temperature or So-called "Cold" Process—*

We indicated our interest in Western Electric "Cold" Process whereby the neoprene mix is dumped from a Banbury mixer into an extruder which produces a 3" wide strip of stock which is rapidly chilled and then can be stored and fed to the continuous vulcanizing extruders at room temperature without going either thru a sheeting mill or a warming mill as is necessary in the "Hot" Process in use at Rome Cable. The "Cold" Process requires a strainer in the head of the continuous vulcanizing extruder.

Mr. Ellis said they had a license for the "Cold" Process from Western Electric but that the process was no good for covering wire and that if it did work you would have to cut your C. V. machine speed in half and that he did not believe Western Electric had the process in operation on covered wire—though it might work on less critical operations, such as molding of battery cases. Mr. Ellis strongly felt the sheeting mill and its thorough mixing and blending, after the Banbury mixer, was essential and, likewise, the warming mill was essential. He said if you didn't do the work on the sheeting and warming mills you did it in the

screw chamber of the C. V. machine whereby you would cut the extrusion speed in half and you would have to put a lot more horsepower on the screws of the C. V. machines. Mr. Ellis felt that if we were going to tie up with the West-[fol. 4968] ern Electric "Cold" Process we should see it in operation on covered wire before we took a chance on it.

*Note:* We do not agree in toto with many of Mr. Ellis' views as covered under "Discussions". Mr. Schatzel for example did not condemn the "Cold" Process so strongly. We point these things out to indicate how controversial all opinions in connection with the industry can be.

*Rome Cable Co. as a Producer of A.C.S.R.—*

We were quizzed at some length in connection with the manufacture of A.C.S.R. Rome Cable is going into this phase of the business. They are perhaps forced into the A.C.S.R. and aluminum conductor business due to the shortage of copper. They questioned us on the pattern of business of 7-strand versus multi-strand cable. This question of course has no good answer, and while today multi-strand may predominate, the pattern varies with changing economy. They also questioned us on performing and types of multi-strand machines. Their questions were rather general in view of the fact that they intend to call on Massena Works in the spring to get more detailed data on the manufacture of A.C.S.R. and aluminum conductors.

*Covering of A.C.O.A. Products on Toll Basis by Rome Cable Co.—*

Mr. E. J. Holeomb discussed with Mr. R. A. Schatzel of Rome Cable at some length, the problems in connection with Rome's covering wire and cable for A.C.O.A. on a toll basis as a temporary expedient to get us in this field of business.

It was tentatively decided that for reel shipments of the finished covered cable, we would ship the cable to Rome on a reel large enough to hold the same length of cable after covering. Rome Cable would probably have to have an extra reel of each size used in final shipment so as to eliminate the necessity of rewinding to get it on one of our reels.

In the case of covered cable to be furnished to customers in coils, we would still want to ship the cable to Rome on reels in long lengths to facilitate covering on their C.V. machines. Rome Cable would have to take care of cutting and coiling and then wrapping for shipment. We would of [fol. 4969] course have to provide labels, shipping tags, etc.

Another possible procedure which Mr. Holcomb discussed was the shipping of a length of cable on a reel which would give a covered reel length (same reel size) plus a coil length. In any case Rome Cable would want to use the same reels which we shipped the cable to them on for the final covered cable reel shipments so as to prevent the necessity of shipping empty reels around and to reduce their problem of storing such reels.

Mr. E. J. Holcomb also discussed with Mr. Schatzel the possibility of Rome Cable Co. providing compounded neoprene stock to us. Mr. Schatzel thought that this could probably be done since they have two Banbury mixers and have some excess capacity. However, he felt that we should figure on this only as a temporary arrangement. He felt that in the long run we would want to do our own mixing, since he believed that that was the only satisfactory method if we were permanently in the business.

### *Observations*

#### *Manufacture of Neoprene Covered Weather Resistant Cable—*

The start of this operation is in the batching room where two men weigh up the various ingredients which go into a Banbury mixerful of neoprene compound. The mix which Rome uses for weather resistant covering is made from one grade of neoprene. This mix is known as #9007 having a gravity of 1.6. The cost per pound of the materials in the mix is 20¢ or 32¢ per pound volume. This does not include some 4 to 7% operating scrap or 1% inventory shrinkage lost in handling and storage of the ingredients. The men weigh up the neoprene and other solid materials and place them in batch box #1, having a capacity of about 200 lbs. The neoprene is received from DuPont in 4-ply bags on

pallets. Each bag weighs about 50 lbs. The pure neoprene [fol. 4970] itself comes in sticks or chunks about 1" square and about 10" long and is covered with a light powder, apparently to keep it from sticking.

Batch box #2 is filled with about 200 lbs. of additional ingredients, including lamp black, clay and other reinforcers or fillers. After the two batch boxes are weighed up, an additional paper bag of perhaps 10 lbs. of zinc oxide is weighed up and placed on batch box #2. The two batch boxes are then discharged by roller conveyor to an elevator which delivers them to the charging platform of the Banbury mixer.

The Banbury mixer operator on the charging platform dumps the first box of the batch containing the neoprene and other solids, etc. into the mixer with a cylinder operated dumping device and closes the ram, which shoves the material thru the hopper into the mixer cavity. The operator then starts the mixer in accordance with the instructions on his "batch card", which for example calls for a total mixing time of 16 minutes, the first 8 minutes being required to mix batch box #1 at low mixer speed with a temperature limit of perhaps 300° F. After 8 minutes of mixing the ram is raised and the second batch box is dumped into the mixer. A large cloud of dust is evolved which is fairly effectively collected by a hood over the charging hopper.

As the powder and filler from batch box #2 are being mixed into the batch at low mixer speed a charge of perhaps 5 lbs. of Circo plasticizing oil is added from a tank alongside the operator. This is done thru a drain pipe from the tank which connects directly to the mixer cavity and the amount of oil added is measured by a scale on a sight glass on the storage tank. After mixing perhaps 3 minutes in accordance with the instructions on the "batch card" the ram is raised and the hopper is carefully swept down, at which time the 10-lb. bag of zinc oxide powder is added. The ram is then closed and the mixer is operated 2 more minutes at high speed, after which the hopper is again swept down and 2 cupsful of liquid accelerator are added from the bucket on the mixer platform. The ram is again closed and the batch continues to mix for 3 minutes at high [fol. 4971] speed, at which time the batch is dumped

from the bottom of the mixer onto the sheeting rolls. The Banbury operator need not be a skilled man if he keeps awake and performs the operations as outlined on the "batch card" and as long as he watches the temperature of the mix.

The mixer is water cooled but the flow of water to the various parts of the mixer is not controlled by the mixer operator. The operator can and must carefully watch, the temperature of the mix, the time, and the load on the mixer motor. If the mixer motor load becomes excessive or the temperature climbs above that prescribed by the mix card he knows he is in trouble and promptly dumps the batch and calls the control laboratory to see what is wrong. The chief difficulty in Banbury mixing of neoprene is caused by reaching vulcanizing temperatures wherein a portion of the mix will partially vulcanize. If this occurs your entire batch is probably ruined and must be sold for a few cents a pound as scrap, or you may elect to take a chance on it and put it thru the extruder. If you are lucky you get a good finished product. If not, you may tie up the extruder for a long period of time and turn out a large amount of scrap. The Banbury mixer we saw in use was a #9 and it was not the universal spindle driven type known as the Unidrive type. They maintained, however, that maintenance had not been excessive on this unit. The unit is cooled by recirculated cooling water which is limited to a maximum of 55° F. when the mixer is used for mixing neoprene. This requires a refrigeration system which, in their plant, had a capacity of maintaining a flow of 650 gals. per minute of 55° cooling water. Their refrigeration unit was a Lunmus, 4-jet, single effect steam jet unit which cost about \$40,000 in 1947. This particular refrigerator would be a much larger unit than would be required for our use in the "Hot" Process.

The handling equipment for the batch boxes between the batching room and the mixer was very elaborate; perhaps much more than we would require. The Banbury mixer room was reasonably clean considering the amount of pulverized fillers and reinforcers used in the batches. [fol. 4972] After the batch was dumped from the Banbury mixer it fell on the 84" x about 24" sheeting rolls which are very similar to a 2-high flat sheet mill laid on its



side. The rolls are driven by square gearing without the use of pinion stands and/or spindles. The teeth on the gearing are rather deep whereby one roll can be screwed in and out to vary the thickness of the sheet without unduly affecting the tooth contact of the gears. The roll on the operator's side is slightly smaller than the back roll. This causes the neoprene batch to always cling or wrap around the front roll. There are two men on the sheeting mill who continually work the 400-lb. mass of neoprene mix which is continually cut, crossed over and worked on the front roll very much like taffy candy. The labor involved here is somewhat strenuous, and it appears to the writer that the operation could be very hazardous in that the men use their arms and shoulders to roll up large sheets of compounded neoprene which they then throw back into the bite of the rolls. A horizontal safety stop bar has been provided above the rolls which a man could hit with his shoulder, arms or head if he should get tangled up. This stop bar actuates an air valve which bleeds air from a Fanwick internal expanding clutch. This special clutch has two elements, one which dis-engages the mill drive motor and the other stops the mill half of the clutch. The entire mechanism works very rapidly and the rolls stop in approximately  $30^\circ$  of rotation after the safety latch is operated. With this arrangement it appears that the mill is reasonably safe. At Rome Cable they claim to have had no serious accidents.

The mixing cycle on the sheeting mill no doubt gives the mix additional work over and above that which it gets in the Banbury mixer. Mr. Ellis feels very strongly that this mixing of the sheeting mill is an important part of the preparation of the material in the "Hot" Process. The men work the batch approximately 5 minutes and we are told they have considerable skill and judgment as to just how much working should be done. After the prescribed amount of work has been done, a rotary knife, along with a [fol. 4973] stripper is swung into position on one side of the front roll. This knife cuts off a 12" wide strip, which is fed thru pinch rolls to a cooling conveyor. The operators keep rolling up and throwing the rubber into the bite of the roll above the stripper as it is delivered by the stripper to the cooling conveyor.

Before the rubber is carried up into the roof trusses by

the belt of a long cooling conveyor it goes thru a bath of cooling water and a bath of water containing latex and soap solution which prevents the compounded neoprene sheet from sticking to itself. After the strip is cooled by fans blowing fresh air over the long belt conveyor the strip is returned to a flying shear near the sheeting mill where it is cut into approximately 48" lengths and is then stacked by the second sheeting mill operator onto batch pallets which have hinged shelves each side of a center panel; each shelf accommodates 3 pieces of sheet. This keeps the bearing pressure very low and prevents the material from sticking together. At this point a sample piece of compounded sheet is taken and identified and sent to the laboratory for control purposes on the batch just mixed. In the laboratory this sample is checked for plasticity after sheeting and before curing. It is also checked for specific gravity and then a sample is cured to check curing time, curing properties, etc. After being cured the sample is then tested for elasticity, tensile strength, etc. This control laboratory either condemns or passes a given batch of compounded neoprene for further application in the continuous vulcanizing extruders.

At Rome Cable they attempt to use the batches of compounded neoprene sheet within 30 days after they are prepared in the Banbury mixers and sheeting mill. When utilized for covering weather resistant cable, compounded neoprene sheet is withdrawn from stock and placed on a warming mill in batches of about 200 lbs. At the warming mill, a small amount of plasticizer is added as the material is worked. At Rome they use two men on each warming mill. The warming mill, for all we can see, is a duplicate of the sheeting mill except that it is probably not as [fol. 4974] wide a mill. Both mills have water cooled rolls which are driven thru square gearing.

After the raw neoprene batch is worked on the warming mill and is warmed up by horsepower input in the form of work, it is removed from the left hand edge of the roll by a rotary knife and slitteer, which feeds a 3" wide strip of warm compounded neoprene stock to a coiling device wherein the strip of stock weighing about 20 lbs. is coiled on a flat steel spool with one flange called a "hat". These "hats" of prepared and warmed strip are delivered to the extruders.

At Rome Cable the extruders were located in a pit or cellar. The pit at the extruder proper was open while the pit over the capstan and curing tube was floored over to convert this portion of the pit into a cellar. The "hats" of rubber were lowered into the pit by a small hydraulic elevator in an insulated box which tended to maintain the heat in the strip which was developed at the warming mill. At the extruder head the operator loaded each "hat" onto a payoff and fed the warm strip into the hopper of the extruder. "Hats" which cooled off too much according to the operator's judgment were returned to the warming mill for re-work. The feed was controlled by spiked pinch rolls driven by a ratchet mechanism from the motor driving the extruder screw. The wire being covered was payed off from a reel on a let-off at main floor level ahead of the extruder. At the edge of the extruder pit the wire was snubbed around a capstan and was held against the capstan by a pair of V-belts running on three sheaves which maintained pressure on the wire against the capstan, preventing it from slipping. The capstan shaft drives a worm gear speed increaser, the high speed shaft of which carries a brake drum. Wrapped around this brake drum was a brake band of leather which was weighted by a small weight of approximately 2 lbs. This speed increaser and small braking action provided for smooth constant back tension required in extruding. The back tension by this method is independent of the diameter of the reel from which the wire is payed off.

[fol. 4975] As the wire left the back tension capstan it went over a sheave and into the pit where it first passed thru a 2-plane roll straightener and then entered the extruder thru the back of the head. The wire was threaded thru the head of the extruder and thru the tip around which fits the die. This head applies the covering on the wire. After the covered wire leaves the extruder head it enters the curing tube. The curing tube has a telescoping section at the extruder head which can be retracted by a rack, pinion and reduction gear driven by a small motor thru a fluid coupling. The curing tube has a steam tight slip joint at this point and seals against the die head. Steam at 250 lbs. pressure is introduced to the inner curing tube thru a 3-way valve; position 1 applying steam to the curing tube, position 2 shutting off steam and exhausting tube to

atmosphere thru vent pipe thru roof of building. The curing tube itself is about 150 ft. long, the internal tube being 4" I.D. for the first 20 ft. Beyond that point the tube drops to about 3" I.D. The curing tube proper is jacketed with a larger tube about 6" I.D. which is maintained at 250-lb. steam pressure at all times and is insulated. At the exit end of the curing tube there is a rubber seal. This seal can be removed and replaced by shifting the cooling tube toward the capstan. The cooling tube is about 20 ft. long and is supplied with cooling water. It is sealed at the exit end and water pressure in the neighborhood of 200 lbs. is maintained in the cooling tube. This water pressure is secured thru the use of centrifugal pumps, using mill supply for suction. As the covered wire leaves the cooling tube it goes thru a spark stand and then to the capstan. At the capstan several wraps are taken and the wire, if large size, is then spooled on take-ups mounted on the floor in the cellar. In this set-up they have two large take-ups set up in tandem and both driven from the same motor by means of chains and clutches. If small size wires are being handled, the wire is returned to the front end of the machine where it is taken up on dual reel take-ups next to the pay-[fol. 4976] offs. In the case of large wires it is not practical to lead the wire clear back to the starting end of the machine as the tension required would be excessive and the wire would be subject to vibration and whipping when going thru the curing tube. Rome has dual payoffs for each extruder and with the dual take-ups they are able to operate their extruders continuously except for shutdowns for change of size, change of seals, week-ends, etc. The following points in connection with extruding neoprene covering on weather resistant wire and cable were made by Rome Cable Co.—

1. In general, stranded wire which is to be covered should be made up of small size individual wires. This gives better concentricity of cover, prevents ridging action which would occur using larger size wires and eliminates voids which might not be filled with covering, this being objectionable on insulated cable, particularly on lines where high voltage and ionization is involved. In the case of

- weather resistant cable these ridges are objectionable from an appearance standpoint.
2. Sizes larger than 1/0 or 2/0—7-strand cable are not suitable for extruded covering. They should be made up of more than 7 strand for satisfactory covering.
  3. A 4½" continuous vulcanizing machine is suitable for sizes up to about 500,000 C.M.
  4. It should be remembered that the scrap loss running a continuous vulcanizing machine is a minimum of 400 ft. per change of size plus 400 ft. every time a curing tube seal is replaced, which is on the average of every 12 hours. Therefore, it is absolutely essential to operate a C.V. machine continuously as long as possible.
  5. Rome Cable saw no advantage of a stainless steel tube for the first 20 ft. of the curing tube. They point out good operation would require tension which would keep cable from touching tube in this region.
  6. Whether or not the curing tube slopes down or is level is somewhat controversial. Rome used a 4" I.D. tube for the first 20 ft. and a 3" tube and offset reducer keeping the bottoms of the tubes aligned for the remainder of the curing tube.
  7. Steam required per C.V. machine is approximately 200 to 250 lbs. per hour at 250-lb. gauge.
- [fol. 4977] 8. 4½" machines are satisfactory for the range of sizes we intend to produce in weather resistant as well as Triplex cable. However, different lead screws would be required for the large and small range of size.
9. Weather resistant wire should be run in longest length available to reduce stringing up difficulties.
  10. Weather resistant wire must be respooled and repaired if there are more than 3 spark breakdowns per 1,000 ft. or if there are any spark breakdowns of long duration indicating a bare section of wire.
  11. If weather resistant wire and cable is to be sold in coils or short lengths, the coils should be made up as a separate operation, not on a C.V. machine.



To operate a C.V. machine, one operator is required, who must stay at the head of the machine at all times. There must be another man at the take-up end of the machine when running large sizes. If you have a bank of machines running large and small sizes the number of men at the take-up end perhaps can be reduced.

The respooling and repair set-up for cable should be near the C.V. machines and there must be the utmost co-operation between these groups as all the repair and respooler men, as well as truck drivers, must pitch in to make a continuous switch of a big cable. We observed a large cable of about 375,000 C.M. being covered on a C.V. machine. This operation requires 2 men to unspool the almost empty reel of bare cable to gain enough slack to make a weld or an attachment of whatever type is required. These same two men saw off ends of cable square and make and file weld while a third man on a platform truck with a horizontal sheave on the platform runs up the aisle of the mill with a loop and enough slack to allow time to make the weld to the new reel. At this weld enters the head of the C.V. machine the operator strikes the bare cable about 3 sharp blows in rapid succession and this causes blobs of excess material to form in the covering which the take-up helpers follow down to the reel and then make a switch to a new empty reel on the fly. We did not see this operation but feel sure that 2 or 3 men would be required to make the switch from one take-up to the other. [fol. 4978] The operator at the extruder head end of the machine controls the relative speed of the screw with respect to the capstan which pulls the wire or cable thru the machine. The motor on the screw and capstan are controlled by V.S. drive unit, the details of which were discussed with Rome Cable Co.'s electrical engineer by our Mr. Plummer. The take-ups of the C.V. machines are driven from the capstan shafts by a chain drive and a type 1000 DoAll 9-speed change gear box with friction clutch to compensate for many sizes of take-up reels.

At Rome Cable a special vulcanizing press is provided for making seals for the vulcanizing and water tubes of the C.V. machines. We did not see this operation.

After the reels of covered wire or cable are removed from the take-up the weather resistant wire is coiled in measured

length, at which time repairs are made by use of neoprene tape and a small electrically heated vulcanizing press.

If the wire is to be shipped on reels and if not more than 3 spark breakdowns per 1,000 ft. and none of these of enough duration to indicate a bare uncovered wire are recorded at the C.V. machine, respooling is not required and the wire can be shipped on the same reel.

### *Manufacture of Neoprene Covered Triplex Service Wire—*

Triplex service drop cable is a 3-conductor cable used by the Utilities to connect from the power line at the pole to a residence. There are generally two 7-strand neoprene covered aluminum conductors, each of which carries 220 A.C. current. These two covered conductors are loosely stranded around one aluminum core wire which is the neutral or ground wire. This neutral or ground wire is bare. The potential between the neutral and covered wires is 110-volt A.C.

The operation of the C.V. machines and the preparation of the mix for making Triplex is essentially the same as for neoprene covered weather resistant cable just described. The mix used normally at Rome Cable is their #9001 having a gravity of 1.97. The cost per pound of the materials in this mix is 21¢ or 41¢ per pound volume. This [fol. 4979] does not include 4 to 7% operating scrap or 1% inventory shrinkage. The material is mixed in the Banbury, sheeted, stored, warined and fed to the C.V. machine in exactly the same manner as for making neoprene covered weather resistant cable. The only difference is that the number of allowable insulation breakdowns indicated at the C.V. machine is limited to zero due to the fact that Triplex is an insulated cable. The individual covered conductors are taken up at the C.V. machine on large reels; are then respooled on about 30" reels, at which time the cable is repaired if any insulation breakdowns occur at the spark stand.

Two of these 30" reels are then delivered to a homemade stranding machine wherein the two reels are rotated about the third bare neutral strand of aluminum cable. The axis of the spool is parallel to the longitudinal center line of the strander head. The head is basically a rigid frame

machine except that the spool spindles are not cantilevered but are supported by arms on each side of the spool. The machine head was designed for 100 R.P.M. but was running only 75 R.P.M. and showed a lot of heavy vibration from unbalance of the two spools. The machine looked very crude and unsafe to us. In view of the fact that individual strands of covered wire are generally multi-strand rather than solid conductors we are of the opinion that this Triplex cable would look much better if it were stranded on a planetary machine wherein the individual strands were not twisted or untwisted as the Triplex was stranded.

The capstan, take-up and other parts of this machine were conventional. Apparently all the Triplex made at Rome was sold on reels as we did not see any respooling operation.

After the reels are taken off the stranding machine they must be subjected to a 2,000-volt insulation breakdown test while the whole reel is submerged in water. This set-up involves a basket or rack which takes several reels of cable which can be lowered by chain falls into a water tank. The ends of each piece of Triplex on the reel extend above the water and are clamped to a high voltage bus for the test. [fol. 4980] The entire area above the tank where these connections are made is screened in by expanded metal panels as a safety measure. If the Triplex cable passes this test without insulation breakdown, the reel can be shipped. If not, the cable must be returned to the repair center for repairs and then must be tested again before shipment.

Rome Cable normally uses their #9001 neoprene mix, which incidentally requires two grades of neoprene, for Triplex wire. However, some Utilities specify a combination extruded cover using some neoprene and some natural rubber. This varying specification on Triplex cover might cause us much difficulty when we are in the Triplex business.

#### *Manufacture of Thermo-Plastic Covered Wire and Cable—*

The Rome Cable Co. does a considerable amount of extruding of thermo-plastic covers on wire and cable. They use polyethylene, polyvinyl chloride, etc. for this. However, the amount of polyethylene they are extruding on

wire and cable for a weather resistant covering has been limited because of the unavailability of polyethylene for this use. They took us thru their new 2-story mill building in which they make a product known as "Spiral 4", which is described briefly in another part of this memorandum. In this building they had all new machines, including a number of new Davis Standard Machinery Co. thermo-plastic extruders. These extruders appeared to be well designed and well built machines and were complete with double payoffs, accumulators at both the payoff and take-up ends, double V-groove capstan, and double take-up, all furnished by Davis Standard. The double payoffs and take-ups with the accumulators permitted continuous operation which is undoubtedly the most efficient manner of operating these machines, although it is not as essential as with neoprene C.V. machines.

The Davis Standard thermo-plastic extruder was equipped with a large hopper with conical bottom and this hopper was filled by means of small chain type conveyor [fol. 4981] from a hopper on the floor into which the polyethylene pellets were dumped by hand. The operator controlled the pellet conveyor by a push button and would shut it off when he could see from the floor that the upper hopper over the extruder was full. The extruder cylinder was equipped with three heating zones. The temperature of these zones were individually and automatically controlled by a Wheelco temperature control panel. Each of the three zones of the extruder had a cast aluminum jacket in which water cooling tubes and Calrod heating units had been cast in. Water flow thru each jacket was manually controlled by valves so that enough cooling was provided so that the automatic temperature control could maintain a given temperature by always adding some heat by means of the Calrod units. The extruding head appeared to be of very good design and was hinged to the extruder cylinder and could be opened or closed by use of a single unit. The head was carefully machined and appeared to be easy to clean. The head was electrically heated.

The covered conductor entered a water cooling trough right after leaving the extruder. There was a gap of about 1 ft. from the extruder head to the cooling trough. The cooling trough was approximately 30 ft. long and the wire im-



mediately went onto a double groove capstan from the cooling trough. The wire was then threaded around a combination accumulator and dancer roll arrangement which was a horizontal unit mounted over the cooling trough. The combination accumulator, dancer roll unit controlled a rheostat which controlled the speed of the double take-up unit.

The double take-up unit was set up in tandem with the extruder, cooling trough and capstan. The wire went directly from the combination accumulator, dancer roll unit to the dual take-up in which the two reel spindles were mounted in tandem. Each reel was driven by an individual electric motor and when one reel was filled the operator would stop that reel and cut the wire and attach it to the drum of the second reel and then start the second reel motor. In the meantime the cable put out by the extruder [fol. 4982] would be taken up on the accumulator and once the second reel was started the dancer roll part of the accumulator functioned to speed up the take-up and bring the accumulator back to its normal position.

At the payoff end the accumulator was a vertical unit and served to allow the extruder to continue to operate by serving wire to the extruder and maintaining back tension in the wire while shifting from one payoff to the other. The two payoffs were side by side and when the tail end of the wire came off from one reel one man merely grabbed the end and stopped it while another man hooked the end to the beginning end of the wire on the other reel. They had some special hooks to facilitate this which had previously been attached to the ends by crimping them on. After the two ends had been hooked together the men released the wire and the accumulator moved back to its original position of fully extended. The reason that this accumulator moved to its fully extended position for normal running was because the counterweight which produced back tension in the wire produced a slightly higher tension than that provided by the brake on the payoff. The payoffs were equipped with brakes actuated by a dancer roll to maintain uniform tension.

Altogether, it was evident that the operating of a thermoplastic extruder was considerably simpler and more flexible than the operation of a neoprene C.V. extruder. A thermo-



plastic extruder could be operated on a one shift basis according to the Rome Cable men. They stated that you could stop a thermo-plastic machine and leave the polyethylene in the extruder with low heat applied for a couple of days without and serious trouble. They also stated that it was about a 2-hour job to clean out an extruder.

The Rome Cable people recommended a 4½" dia. cylinder as the correct size extruder for the range of wire and cable sizes which we are planning to cover. They thought this was the correct size extruder for us for both polyethylene and neoprene. One point to remember is that the [fol. 4983] speed of extrusion for neoprene compounds depends mostly on the length of the curing tube and the thickness of the covering, whereas with polyethylene the capacity of the extruder is the influencing factor. In general this would mean higher extrusion speeds for polyethylene for a given size of extruder. The Rome people seemed to feel that in operation of an extruder you should stay below 85 to 90% of the extruder capacity.

Some other points brought out in our observations and discussions in connection with thermo-plastic coverings at Rome Cable Co. were as follows—

1. They would recommend the use of double grooved type capstans for polyethylene extruders as well as for neoprene C.V. machines.
2. Price of natural polyethylene —52¢ per lb.  
Price of precompounded black polyethylene—55¢ per lb.

The above are quantity prices. By purchasing precompounded black polyethylene you can eliminate the need of purchasing an integrating sphere photometer for laboratory testing of carbon black dispersion called for by A.S.T.M. specifications.

3. Amount of cooling water on polyethylene extruders small, probably a total of only 2 gals. per minute for cylinder and screw cooling. They did not estimate the water for the cooling trough but it was noted that a 1" O.D. copper tube supplied all the water for cooling trough, cylinder and screw cooling.
4. They thought that we could use the same screw for all of our polyethylene extrusion work. Using a

4 1/2" machine, a shallower screw might be necessary on the very smallest wires.

5. They pointed out that the size of wires in the outside layer of a cable to be covered by either polyethylene or neoprene must be limited or you might run into trouble in getting a round uniform cover.
6. When they were extruding a polyethylene cover on a single wire (not a jacket) they used a spark testing unit ahead of the capstan the same as on a neoprene extruder. This spark tester recorded on a counter the number of faults in a length of wire and cable. Any length of wire which had too many faults in the cover would be sent to a repair area the same as with a neoprene cover. When faults were found with the spark tester on this rewind-repair set-up, the damage can be repaired with a Minnesota Mining & Mfg. Co. tape #300. A Muff vulcanizing press is used for this and heat is applied in the dies of the press to melt the patching tape and form it.

[fol. 4984] 7. Rome Cable Co. in some of their operations extrude polyethylene covers on two wires at the same time in one extruder. This is done only with very small wires and they stated that on the size of wires which we are contemplating to cover, it would not be feasible to cover more than one at a time.

When they did this double extruding of wires on one extruder, they doubled up on practically everything else, that is, 4 payoffs, 2 accumulators on payoff end, 2 combination accumulator and dancer roll units, and 4 take-ups. The capstan unit served for both wires but had separate grooves in the capstan bull wheels for each wire.

8. The operator on a polyethylene extruder checks the O.D. of the covering of the cable he is producing with ordinary micrometers. Regulation of the speed of the screw or the speed of the cable controls the vernier adjustment of the O.D. of the finished covering. The operator on the extruder carries micrometers and checks the O.D. of his finished cable coming off at frequent intervals. This is also true in the case of the operator on a neoprene extruder.

*Manufacture of Cotton Impregnated Type of Weather  
Resistant Cable—*

The Rome Cable Co. people advised us that cotton impregnated type of coverings for weather resistant covered cables still constituted approximately 80% of the total volume for the industry as a whole. They also stated that with the Rome Cable Co. the percentage even ran a little higher.

In our trip thru the Rome Cable Co.'s mill, we saw them putting on cotton type coverings using both braiding machines and knitting machines. Their braiding equipment consisted of both maypole type braidiers and Wardwell type braidiers. They had a very large number of braidiers. For operating efficiency they had braidiers arranged in two parallel lines, face to face, perhaps 10 to 12 or more per line, with an operating platform (3 ft. high) between the lines. Some of their maypole type braidiers were apparently quite old machines and very slow. The operations of their braidiers appeared to be the same as what we do or have done at Massena. They put on both double and triple braid coverings.

[fol. 4985] The knitting machines which we saw at Rome were the "Sinfra" type machines manufactured by the Fidelity Machine Co. These machines cover at speeds about 2 to 3 times as fast as a braider. The cover is knitted on by a group of special needles which are actuated by a cam. Their machines were all arranged with three heads for triple coverings, and they advised that with knitted covers they always put on a triple layer cover to insure satisfactory covering.

These "Sinfra" knitting machines are a much simpler machine than a braiding machine. About the only moving parts are the needles and operating cams and these parts require the major part of the maintenance on these machines. The needles have to be replaced at frequent intervals but even so the maintenance on these machines is less than on a braider. There is a good deal of fuzz, from the cotton threads, covering these machines and the area and this of course constitutes a fire hazard, but we have this same condition to a certain extent on our braiding machines. The yarn supply is on large cops or cones placed on support

spindles on the back side of the machines. The individual yarns are fed from their respective cops up thru an automatic tensioning and stop motion device on an overhead rack and then down to the knitting heads. If a yarn breaks, the stop motion device shuts down the machine.

The "Sinfra" machines are equipped with a small straightening head at the entry end for straightening the wire as it enters the machine. However, Rome Cable did not appear to be using this device on any of their machines. They did pass the wire or cable thru the straightener, but the rolls in the straightener were not adjusted to do any straightening. These machines were equipped with a 36" single flat capstan and about a 40" reel take-up unit driven from the main machine. These "Sinfra" machines were equipped with individual saturating tanks for impregnating the knitted cover so the impregnating could be done at the same time that the covering was knitted on and this saved an additional operation. The "Sinfra" type knitting machine lends itself to this additional operation since they are a horizontal type of machine instead of vertical like a braider. [fol. 4986]. Since the speed of cable even from a knitting machine is relatively slow (about 25 ft./min.), few wraps around the drum in the saturating tank are required.

The Rome Cable people pointed out that they did not always use the individual saturating tanks on these machines since it was sometimes more economical for them to impregnate in their large impregnating set-up when they were operating these large units and had the capacity available there. All the braided covers were impregnated in the large separate saturating tanks.

The saturating tanks for putting on the asphaltic impregnating compounds as a separate operation appeared to be conventional. At one location which they showed us, they had 2 saturating tanks, side by side, in an old wood truss building and in this set-up they had their payoffs and saturating tanks in this old wood truss building and then the wire or cable was passed thru doorways in a brick wall onto the take-ups in the adjoining building. The saturating tanks were open with an exhaust hood over them. The saturating tanks had a large driven drum nearly submerged in the asphalt compound and they were taking many wraps around this drum to secure maximum saturation. The cable was



taken up on metal reels, about 36" dia., on the take-up units.

The next operation was the wax covering of this impregnated cable. The metal reels were set up in a payoff frame and the cable was first passed thru a wax covering unit. This unit consisted of a tank heated by steam in which the wax material was melted. They were using a Styrene pitch material loaded with filler (such as slate dust) and they obtained this material all compounded from sources such as Trotter, Solar, and H. H. Robertson. They pointed out that since this cable was sold on a weight basis, it was desirable to use a maximum amount of wax filler as allowed by A.S.A. specifications. This wax tank had a conical bottom and was fitted with a tee head at the bottom thru which the covered wire or cable passed. This tee head was [fol. 4987] fitted with entry and exit guide bushings or dies to prevent leakage of the wax compound, and to provide a uniform coating. A small Bunsen gas burner was used at the bottom of this tee head apparently to keep the head warm enough to prevent any setting up of the wax compound within the head. Without cooling the wax covering, the cable was then passed thru a heated mica dusting unit. This mica dusting unit was equipped with a blower which stirred up the mica dust to give the cable a good uniform coating as it passed thru the chamber of the unit. We believe that the air was heated and a cyclone separator was employed to separate the mica dust from the exhaust air leaving the chamber. It is probable that this mica duster was a purchased unit. There appeared to be much less waste of the mica powders compared to our method of application. The wire or cable was then passed thru a water cooling tank over a capstan and onto a reel.

Rome Cable advised us that this product was sold both on reels and in coils. The coils were approximately 19" I.D.



### General Observations

During our inspection trip, in addition to the manufacture of weather resistant and Triplex wire and cable, we observed other operations as follows—

#### *Copper Rod Mill—*

This mill was rolling  $\frac{5}{16}$ " copper rods from about 4" x 4" x 60" copper wire bar. They utilize 2 pusher type oil fired preheat furnaces which discharged onto a driven table which fed a 3-high breakdown stand individually driven, where the bar received 2 passes—there were two more 2-high breakdown stands where the bar received 2 additional passes. Then on Belgian train mills the bar received an additional 11 passes, or a total of 15. After pass 4 the rod was repeated and caught by hand alternately. The looping table and runout table sloped rather steeply and not many roller guides were used. There were 4 coilers on the mill and it was delivering rod at about 1400 F.P.M. [fol. 4988] (my guess—JCG). There were 2 strands in the mill after about pass 8. There were about 9 men on the mill. The mill was old and very compact. They changed rolls by monorail. There was no crane in the building. The mill was a single purpose rod mill with many toggled up labor saving devices to make it a semi-automatic mill. They had 2 men tying coils when they were in a horizontal position after being kicked out of the coilers. This looked dangerous, if they had a coiler cobbler the men would have to jump. However, the coiler speed was only about 1400 F.P.M. After being loosely tied, the coils were automatically up-ended and hung on hooks of an overhead continuous hook conveyor. This conveyor took the coils thru a sulphuric acid dip which removed scale and produced a bright coil. The dip produced copper sulphate which in a recovery process was reduced to electrolytic copper. This same recovery unit was used to copper plate all the steel spools used in the wire drawing processes. After the coils came from the pickling tank they were inspected. Ends were cut off and a third tie was applied. Then, all 3 ties on each coil were snugged up with a speed wrench with a hook on the end. Such a device might have an application at Massena. Coils were stocked or stacked and delivered to

the continuous rod drawing machines, similar to our Vaughn and Waterbury machines in Bldg. 1 except that they were probably 15" capstan machines. They were Vaughn and Syncro machines.

They were effectively using the overhead type payoffs which we have tried out here and which we understand Vancouver is using. They had one difference—the flat conveyor to deliver coils from the pinload in a horizontal position was a driven slat conveyor and was operated by the welder. A man still seemed to stay right at the payoff to prevent trouble. See page 8 of Rome Cable Co. publication "Bare and Weatherproof Wire and Cable."

### *Labor Situation—*

Rome Cable Co. has no Union in their plant. Labor relations seemed to be excellent and there seemed to be a lot of flexibility in the types of work expected from each man. [fol. 4989] There seemed to be a good spirit of cooperation between employees. The company, as pointed out by Mr. Ellis, spends a lot of time, money and effort keeping such relations. They have many social services such as complete annual medical examinations, etc. for every employee. Rome Cable Co. has no trouble getting the better class of labor as the men are always ready to leave General Cable and Revere to work for Rome Cable—this was Mr. Ellis' opinion.

### *Laboratories—*

The Rome Cable Co. has quite extensive laboratories for the control and testing of the various products which they make.

On a brief trip through their laboratories we saw oxygen bomb aging equipment, accelerated ozone aging set-up, various high voltage insulation testing set-ups including immersion tests, etc. In another part of their laboratory they made tensile tests, plasticity tests, and performed experimental work in developing coverings. They had a small extruder, a small Banbury mixer, small working rolls, etc. which could be used as a pilot plant set-up or in developing new compounds.

In their laboratory they also had set up a striping ma-

chine where they were putting a special stripe on plastic covered wire with a special dye or ink. After passing through the marking pen the stripe was carried up vertically in a circular stairway first past heat lamps and then up and over a sheave on the second floor landing and returned back down to complete the drying before spooling. The speed in feet per minute appeared to be fairly high, maybe 1000 ft. per minute. They stated that it was an experimental project as yet but they were actually operating on somewhat of a production basis.

Although much of the equipment in their laboratory at Rome Cable is required because of their insulating business, it appears that the following items would be needed in the weather resistant coverings—

[fol. 4990] 1. Tensile testing—they use a Scott testing machine which has a testing speed up to 20" per minute and which is much faster than anything we have in our laboratory at Massena. Their Scott tester had special jaws. We would need a similar machine for this since the speed of our present machines make them impractical.

2. Oxygen pressure aging test equipment. This is necessary to check specifications on neoprene cover. Rome recommended this equipment in place of air pressure aging which requires a longer time interval test.

3. Plastometer test—Rome Cable was using a plastometer test unit made by Firestone for a rapid qualitative test for control of the mix. In the laboratory Rome Cable also used a Scott tester for plasticity test. This is a quantitative type of test used as final tests to check specification requirements of finished product.

4. Size checks (O.D. of covering) are made by inspectors in mill using micrometers. However, the use of micrometers for this check of specifications requires considerable technique to obtain consistent and reliable readings. This check is required on both neoprene and polyethylene.

### *"Spiral 4" Signal Corps Wire—*

Rome Cable Co. has a contract with the U.S. Government to manufacture the product known as "Spiral 4". This is a special telephone or communications cable which can be laid from a plane and can be laid over land or water. This "Spiral 4" consists of 4 polyethylene covered wires around a polyethylene core and enclosed in a polyethylene (black) jacket.

Rome Cable Co. built a new modern 2-story mill building for the manufacture of this "Spiral 4". They are allowed a 5-year write-off of this building and all the machines in the building are Government owned.

The manufacture of this "Spiral 4" requires the drawing of fine copper wire which is stranded into a small 6/1 cable. They have a large number of small (16" tube) high speed tubular stranders manufactured by Syncro Machine Co. on which they do this stranding. These small cables then have a polyethylene cover extruded on and one Davis Standard extruder does this to 2 of these cables at the same time. They have several machines doing this.

[fol. 499f] Other operations in this mill include the extruding of a polyethylene core and then the stranding of 4 of the polyethylene covered cables about this polyethylene core. The next step in the manufacture of this spiral cable is the extruding of a polyethylene jacket around the stranded cable. They have 4 Davis Standard extruders for this purpose. The final step in the production of this cable is the installation of special terminals or connectors to each end of each length of cable. These connectors have to be water tight and there are several steps in the installation of these connectors.

They have an elaborate set-up of test equipment and each length of cable produced must be tested thoroughly. Many different types of tests are made.

This "Spiral 4" product is finally made ready for delivery on special metal reels with special heads for the connectors.

### *Pan Vulcanizing and Lead Sheathing—*

The Rome Cable Co. was also doing a large amount of pan curing of their insulating rubber covers. In this pan



method of curing the cover, as the cable left the extruder where the compound was put on, it was coiled onto a large pan (about 15 ft. dia.) in a soapstone powder to prevent the coils from sticking together. The pan was later moved to another location where it was covered with a large hood or oven and steam applied to cure the compound under pressure for a prescribed time cycle.

On the very large cable, they extrude a lead sheath on the cable over the insulating compound and then the cable is coiled onto a pan in a soapstone powder for "pan vulcanizing" of the compound. In some cases, they reeled the lead sheathed cable up on large metal reels (very wide traverse) which were placed in a special steam oven for curing. After curing in the pan vulcanizing oven, or on reels in the steam oven, the cable is payed off thru a machine for [fol. 4992] removing the lead sheath and wound up on a reel. This unit, which removes the lead sheath, has two rotary slitting knives which cut the lead sheath on opposite sides of the cable and then the lead is pulled off by rolls with serrations on top and bottom of the cable. These serrated rolls are driven and above the top and below the bottom roll is an idler roll with ridges on its face which cuts the lead off or nearly off so that it breaks apart and falls into a container in short pieces. It is probable that this lead stripping machine was a purchased item and not Rome Cable Co.'s own design.

### Conclusions

After collecting our thoughts and data secured at Rome Cable Co. we, at Massena, find we must change our thinking somewhat in connection with the manufacture of weather resistant and Triplex wire and cable. We believe this change in thinking agrees generally with Mr. Knowse's and Mr. Plummer's views. Our conclusions as of now are as follows—

1. The manufacture of these products is actually much more complicated than we had anticipated.
2. More technical control is required than we thought. One good rubber chemist will be required full time.
3. More elaborate laboratory and control equipment will be required than was originally planned.



4. We should not commit ourselves to the "Hot" or "Cold" neoprene process until we know much more about the "Cold" Process.
  5. We should definitely buy a Banbury mixer and be prepared to mix our own compounds. Mr. Schatzel did indicate that we could probably call on them as a temporary supplier of sheeted compound if necessary in getting into production.
  6. Decisions on extruders versus sheeting and warming mills must be held up pending further study of "Cold" Process.
- [fol. 4993] 7. We should make a strong effort in our advertising and sales program to keep our covered wire products limited to the simple ones; viz., weather resistant and Triplex for the initial period at least.
8. We should be considering the purchase and operation of "Sinfra" knitters for making cotton covered weather resistant cable if we are to believe that 80% of the business is in cotton covered wire and cable and will remain so. Kindly refer to Rome Cable Co. bulletin (attached to Mr. M. E. Noyes copy) which devotes many pages to weatherproof wire and cable, giving a good deal of specifications for cotton covering, but devotes only one small paragraph on page 25 to extruded coverings.
  9. We should study revisions to our process of making braided weather resistant cable toward incorporating certain practices employed at Rome Cable such as the use of loaded wax and heated mica dust application.
  10. From our observations at Rome we lean toward Davis Manufacturing Co. as being the more progressive manufacturer of C.V. and polyethylene extruders. However, this opinion is subject to change as we saw no modern Royle machines at Rome.
  11. We should inquire more specifically into priorities required to get this type of equipment. Mr. Ellis, in contrast to information from suppliers, feels that N.P.A. will be reluctant to authorize expan-

- sion in this field as the copper industry still has surplus capacity.
12. An extensive cable repair and respooling center must be provided as perhaps 90% of our finished production will have to funnel thru this center.
  13. The C.V. covering department must operate on a 3-shift basis and will require considerable backlogs of cable and raw material as well as warehousing of finished products and careful planning so as to secure long uninterrupted runs.
  14. Of all phases of the business the neoprene covering is by far the most difficult to pursue and if in any possible way we could limit our products to polyethylenes we would be in a much more favorable position. (We doubt that such a limitation is even a remote possibility at this time).
  15. With additional facilities required such as refrigeration equipment, respooling, insulation repair, water submergence test for Triplex, process control laboratory, etc., which were not originally contemplated, we feel present estimates of the cost of the project are too low and that the area available in Bldg. 56 will be much more congested than original floor plan studies indicate.
- [fol. 4994] 16. A definite problem of removing and salvaging aluminum wire from neoprene covered scrap exists. We are doing some experimental work on this problem now and hope that we may be able to remove neoprene economically by charring and then tumbling the scrap.
17. Operating personnel other than technical control people, in our opinion, do not have to be highly skilled. We believe we would have little trouble filling the hourly rated jobs in such a department.
  18. In the organization and supervision of an operation of this type it is essential that there be a very fluid crew of labor on material handling operations and respooling and cable repair work who can rapidly drop their assigned work and pitch in to help make rather complicated flying changes from reel to reel at the C.V. machines.
  19. From information secured at Rome Cable Co. ap-

parently physical properties of aluminum wire and cable will not suffer as much from tension and temperature in the neoprene vulcanizing process as we had originally expected.

Properties of A.W.G. #4 solid aluminum neoprene covered as tested at Rome are—

	<i>P.S.I. Tensile</i>	<i>Elongation—%</i>
Minimum .....	22,075	1.25
Maximum .....	23,050	2.18
Average .....	22,650	1.77

and for A.W.G. #4—7 strand .07772" neoprene covered—

Minimum .....	24,850	1.8
Maximum .....	27,800	1.9
Average .....	26,188	1.85

We do not definitely know, but we think that the aluminum before covering was EC-H19. This data from Rome is very incomplete and does not indicate whether the covering operation has any effect on the size of the wire being covered or not. When we are giving Rome Cable some toll covering work we will then be in a position to completely check properties and diameters before and after covering and vulcanizing.

20. In general, multi-strand conductors which are to be covered by extrusion should be made with a larger number of conductors than is our practice with A.C.S.R. This is desirable to insure a concentric covering without spiral ridging and voids, which detract from the appearance of the finished cable. Sizes larger than 1/0 or 2/0 should be made of more than 7 strands to insure satisfactory covering.

[fol. 4995] 21. We feel that Massena Works should subscribe to certain technical publications devoted to the rubber industry and also to the complete series of A.S.T.M. specifications. We are taking steps to do this.

22. We got the impression that the insulated wire business is a highly competitive one and practically all the insulated wire manufacturers already offer weather resistant covered wire and cable.

23. The mixing, extruding and handling of neoprene is very critical. The raw mixes are very heat sensitive and if any portion of the mix reaches the curing temperature prior to its entering the C.V. machine curing tube it is scrap and cannot be reclaimed.
24. The original manpower estimates upon which Mr. Kerry based his production costs should be reviewed. Additional men are required for technical control, respooling and cable repair, warming mill operations (if we should go to the "Hot" Process), testing crew for submergence test of Triplex, etc. We also may need 2 or 3 maintenance men per shift to keep such a department operating on a 15,000,000-lb per year basis.

Our final conclusions are that even though the profit in this phase of the insulated wire business looks promising, we should not be too optimistic; there are many unknowns, pitfalls and techniques and problems not yet apparent.

Mr. Kerry's estimates of Feb. 8 and Feb. 19, 1952 of profit on such an operation we now feel should be reviewed in the light of additional technical control and manufacturing facilities required, possible scrap losses and changes in manpower—Items 2, 3, 12, 15, 23 and 24 above.

We believe that with an installation of proper equipment at Massena Works we can operate a profit making unit. However, we do not wish to leave the impression with Top Management that we can show a profit the first few months of operation, as there is much to learn thru experience.

J. C. Glascock, W. W. Wheeler

JCG, WWW, EM—

Cc to: Messrs. J. P. Haight, D. R. Knouse, E. J. Holcomb, M. E. Noyes (2) T. H. Kerry, J. H. DeKlyn & A. J. Stewart.



[fol. 4996] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 72

Mr. H. T. Dyett,  
Hobe Sound, Florida

16 February 1952

Dear Bert:

It was nice to talk with you on the phone from New York. I have just finished dictating this report and probably may not review it before it reaches you. If so, please overlook any inaccuracies that may have perchance crept in. This may be more detailed than you would prefer to have it but it was such an important conference, or at least so I appraised it, that I thought a convenient record for Ross might be of help, even though much of the matter contained in it leads to the same conclusion.

We will drop you and Edith a card from Jamaica and have only just learned over the phone from someone who has returned this week that where we are going is a particularly lovely spot. We will be with our old friends from Bermuda and it should be a quiet, pleasant time.

It appears that the Properzi equipment will be installed at Davenport in time for an inspection shortly after I return. This news was received by Charlie Ellis this week. All the information that comes to hand leads to the inescapable conclusion that whereas copper producers are perhaps alarmed at the unfavorable publicity directed toward lack of copper and therefore will take every step to increase supply, nevertheless the aluminum situation will continue to improve much more rapidly and that it is only a question of reasonable time before there will be ample aluminum from the three billion pound capacity program.

This has been accelerated by the severe cutback to the aviation program, therefore releasing capacity in the next few months to other needs. It seems generally agreed that the aircraft companies have piled up their inventories with the help of Wright Field and perhaps are also guilty of over-ticketing in order to protect themselves. If so, with a cutback this should be shaken out and should be apparent, unless some new factors enter into the situation not now foreseen. As Ross may tell you, the Steel Corporation in-



dictated at the Kroger dinner this week that steel may be in over-supply during 1952; stating that "these were straws in the wind but that they were substantial straws."

With best regards, J. Carlton Ward, Jr.

jew:mnk  
enc.

[fol. 4997] J. Carlton Ward, Jr.  
Farmington, Conn.

16 February 1952.

Memorandum regarding visit of Alcoa representatives to Rome, N. Y. 13, 14 February, 1952.

The following three gentlemen represented the Massena plant—

Mr. Edward Holcomb, Mr. William Wheeler, Mr. James Glascock—

and in addition there were two engineering representatives from the main office in Pittsburgh, namely—Mr. Dale Knousse and Mr. R. W. Plummer.

From a general discussion held immediately after their arrival, it seemed clear that all of these gentlemen were arriving under instructions that they were to get as much technical and manufacturing information as possible relative to Neoprene and Polyethylene types of weatherproof wires. At the beginning of the meeting their questions were more of a general nature and reflected the fact that they had had previous meetings with the Boyle and Hall extruder people as well as with the DuPont representatives. In the course of the discussion they asked a number of questions about rates of production and subsequently they produced a memorandum worked up from their conversations with the machine manufacturers. On the whole their figures were surprisingly good although in general slightly below the Rome figures. These figures were for extrusion speeds only.

Naturally they were interested to know what sizes of wire they should be ready to manufacture and during the two days they produced some make-up tables for their ACSR cables which they felt they would have to insulate. These tables showed some unusual stranding lays due to the

manner in which their customers juggle the steel core in order to get the necessary tensile characteristics for their special tower spacing. In general, they realized they would have to make from #6 through the larger C.M. sizes. They wished to know if 1,000,000 C.M. would go through the C.V. machine and if not, up to what size they could count on for a 4½" worm feed machine. Shallow vs. deep groove worms were discussed and particularly in relation to the sequence of operations from the Banbury mix to the C.V. machine. They had been told that they could do away with the warming rolls by substituting a worm-fed strainer in accordance with Western Electric practice. Charlie and Rudy made it clear this could be done but that they did not feel Western Electric's production compared favorably with that at Rome Cable and that Rome would prefer their present practice of using warm-up rolls.

It was clear that the Alcoa representatives did not have much information or knowledge on the insulating compounds and had naively assumed that one Neoprene compound would serve their needs. This point was cleared up when they were taken through the factory and were allowed to witness the operation of a Banbury machine and examine the number of batch cards in the rack, together with Rudy's explanation as to the reasons for their being more than one Neoprene compound and that different customers also utilized different constructions. For instance, a soft compound was suitable for a single conductor but a hard compound was necessary for 3 wire combinations in order to resist deformation after twisting and under load. This had a disheartening effect and their illusions regarding manufacturing simplicity were being rapidly dispelled. In sub-[fol: 4998] sequent conversations on the following day the question of entrance cable and service drop wires was thoroughly presented and it was pointed out to them that from the utility's point of view, the arguments brought to bear upon their sales representatives for them to get into weatherproof if they were to receive favorable consideration with their ACSR line was also going to be brought to bear after they were in weatherproof production in connection with other utility requirements, largely in the insulated field, and that service entrance and drop wire was a "twilight zone!" They were shown that Public Service of New

Jersey would require an underlying rubber insulation before the Neoprene was applied and this apparently disturbed them considerably. They were heard to remark from time to time that it was clear to them that the Rome representatives did not believe they could get into weatherproof wire without shortly thereafter being pressured to get into other lines, with the result that they would be in the insulated wire and cable business before they got through.

Mr. Holcomb, the Assistant Manager of Massena, remarked to me when I took him home on Wednesday night after they had made their decision to stay over another day, that their plan to go into weatherproof seemed as though they might get into a very complex business, ending by manufacturing what he called "end products." This he stated had not in the past been Alcoa's policy. It was clear that Kaiser's aggressiveness was driving them into consideration of this problem, particularly for the weatherproof field.

To conclude this line of thought, their subsequent thinking on Thursday was that it would be nice if they could avoid Neoprene and merely manufacture Polyethylene, as this was simpler and there was no compounding problem, as the material arrived in form to apply directly in the C.V. machine.

To return to their plant inspection, they asked a number of questions in the rod mill and particularly with respect to quality control. They commented to me on the degree to which repcaters had been applied and indicated that they felt a good job had been done but that we could go further.

In the wire mill they were especially interested in the continuous wire drawing and welding practice and particularly with respect to the method of handling the coils so that they would not give trouble on the drawing machines.

In the weatherproof mill, they were interested in the knitting machines and the braiders and commented that for a long time they had avoided making any changes in their braiding plant on the theory that it was something they could get rid of and that this had been going on for some time. They apparently did not think very much of this operation and were not enthusiastic about staying in the braided weatherproof field. I did not gain the impression that they were interested in going into the knitters.

In the rubber mill they apparently became very confused at the complexity of the processes, the wide variety of machines and the inspection and quality control, as well as the final electrical testing. They seemed to regard the different forms of insulating and vulcanizing including the C.V. machines, the drum vulcanizers, the pan vulcanizers, and the lead sheath process as very complex.

[fol. 4999] They began to understand why so many compound formulas were required. They spent a great deal of time in the basement observing the stranded cable being vulcanized in one of the large machines and saw a splice made and run through the machine. This was the type of information that they were particularly interested in and keen to observe.

Upon returning to the office a long conference resulted, in which a great many detailed questions were asked, not only as to shop techniques but with emphasis on costs and cost methods. They seemed to be shocked to find that two 200 foot lengths of cable had to be scrapped each time the C.V. machine was shut down for splicing, for change-over, for quality defects, etcetera. This brought up the question of scrap metal salvage and they emphasized that this problem had not been solved. They asked Charlie and Rudy many questions and were surprised to learn that when Messrs. Davies and Noyes had been to Rome on the previous visit they indicated that this type of scrap could be shipped to Massena for recovery. The Massena representatives told several instances where the cost of recovery turned out to be more than the value of the recovered product and indicated that they had worked on the problem but had not reached a satisfactory solution. They agreed that Neoprene types would be the worst, because of the compound adhesion.

They were particularly interested in finding out how much shrinkage there is to a batch of compound and what the cost of ingredients was and if there was any salvage to the insulating compound. They were told that Neoprene had none and that under certain conditions scrap Polyethylene, being a thermo-plastic, can be re-used. As previously indicated, the Polyethylene seemed to be a way out for the factory and technical people in that they indicated it would be nice if they could settle for this and avoid the complexities of Neoprene and the tendency toward getting into border-



line insulated wire and cable problems. They certainly did not wish to go into immersion testing as it would apply to insulated cables.

Charlie and Rudy did a splendid job in impressing on them the competitive situation and the necessity for good production and minimum scrap. In fact I can say as an observer that both Charlie and Rudy must have made a great impression by their frankness, their manner of supplying the answers to a great variety of questions including those of a general and a detailed nature. They were heard to remark on several occasions that they had certainly been given every consideration. I particularly noted the fine teamwork between Charlie and Rudy in handling the production and technical questions and I am certain that this also made a fine impression.

It was clear during this conference that they wished to see more of the mill and that while it was late in the day and they had their bags packed and ready to go in their car outside, that they preferred to stay over night and return the following day. Therefore it was arranged to take them through the Spiral-Four Department, which lasted until approximately 6 o'clock, where Rudy and I took them to dinner at the Rome Club and then I drove them to the Green Lantern for the night. They were delighted with their trip to the Spiral-Four Department and commented on how clean the department was and what a fine impression it made. Upon learning the time from inception of the plant they were impressed with the accomplishment. They had little knowledge of such a complex construction [fol. 5000] and likewise the connector problem but their engineering competence was quickly reflected in their ability to assess many of the machine features in the new equipment. They were very interested to watch the accumulators at work as well as the high speed stranders and cablers. They made a special note of the inspection consoles.

I have not mentioned their trip through the laboratory which gave Rudy an opportunity to show them the various testing machines, the pilot line for insulating compound mixes and the generally large amount of technical work necessary for a full line. There seemed to be some hesitancy on their part to contemplate getting into a business



not too close to their Aluminium metal fabrication and we were able to point out that insulated cables were largely a chemical and electrical engineering problem, quite a different field from the mechanical and metallurgical problems which they normally dealt with.

The following day they went into conference and this continued until I left, during the lunch hour, for New York to meet Ross Fraser. The conference continued and I understood merely gave them more technical information without apparently altering the nature of their conceptions as far as they could be ascertained.

In summary, it seemed clear that they had come under orders to get as much information as necessary to help them to manufacture weatherproof wire and cable. All representatives of Alcoa seemed efficient and competent as far as could be observed and the writer is not in a position to know what their recommendations will be or whether they have been asked to make any recommendations other than as to equipment and methods for doing the job. However it would seem reasonable to assume that they left with a far clearer picture as to the complexity of the problem and secondarily as to whether they could stabilize their manufacturing on any simple basis, such as limiting themselves to Polyethylene wire or even Polyethylene and Neoprene types. As far as one could tell, they had no especial desire to take on these problems although this comment may not wholly apply to the technical engineers who were present as apart from the manufacturing men.

It would seem that Ross's hand should be strengthened by this visit in reaching or attaining the type of relationship that might be most desirable for the Rome Company and the Alcoa Company to have with respect to each other in this and allied fields.

jew:mnk

Carl Ward

[fol. 5001] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 74

Aluminum Meeting, March 3, 1952

Present: A.D.R. Fraser, J.H. Dyett, G.E. Rolston, C.H. Ellis, R.A. Schatzel and G.A. Weiss

Ross: The meeting is called for a discussion of where we are on the arrangement with the Aluminum Company. I believe that the basis of the arrangement will be a memo which they will write to those in their organization and which will be approved by us, and in turn, we will write a memo for our organization which will be approved by them. This is not a final decision however. Bob Groben is coming at 2:00 o'clock today to review GAW's findings on prices, etc., and also to discuss the topics which should be covered in the memo. At the present time we cannot discuss prices; some costs, some ceilings are being assembled. I believe that on some ACSR and some of the Rolene no ceiling prices have been filed. Glenn and I have talked this over and believe that it would be better to deal only with those items on which ceiling prices have been filed. We will probably go to Pittsburgh one day this week on this matter. The next question is, who is going to take care of the arrangements with Massena or Pittsburgh on such things as tags, reels, lengths, etc. Rudy is preparing weights for some sizes, just on Neoprene.

R.A.S.: I am also preparing specifications for accepting conductor.

Ross: There are also the matters of reel policy, put-up, cartons and finally the question of publicity. I have asked Gerry to work on an outline of an announcement. At the meeting in Pittsburgh I hope that we will both agree on a letter.

C.H.E.: We might start on an outline of the arrangements with Massena.

Ross: I have asked Max to prepare the details on sizes he will ship down, so that we can take advantage of any open capacity in March.

R.A.S.: Publicity would have no bearing on what we are doing, since we are already buying conductor from them.

[fol. 5002] Ross: This month I think we would probably use our tags. Jack should check on lead time on tags, bills of lading, shipping documents, etc.

Ross: I think Holcomb should hop down here this week and determine who should handle these matters in his organization.

C.H.E.: I would like to see it set-up in the form of packaging specifications.

R.A.S.: I think we need specifications on the put-up that they ship to us. I think it would be better for us to go up there for that. Could we arrange for 'Mac', and Gus and maybe Jack Kell to go up and talk over specifications?

Ross: I don't want to send more than four. Whoever is going to do the ordering should go up there. I would like to see the whole thing coordinated in some way. I believe that Pittsburgh's problems and Rome problems should be handled either by Sales or Administration.

C.H.E.: I think Holcomb and I should act as contact. Rudy and I should sit down and delineate the fields in question. I don't know what they know about finished packages.

R.F.: I think they would want that information from here.

G.E.R.: The sales would arrive at the package size, etc.

C.H.E.: I think that the question of the size to get here is a production problem.

R.A.S.: It also involves questions of where we can permit welds.

Ross: Suppose I talk to Ralph Davies this afternoon and tell him that we would like to have them designate someone to talk to Charlie and Rudy. We should prepare information for all sizes as to what our shipping package is, coils, size reels.

G.E.R.: Their reels don't match ours at all.

Ross: There is a question whether they will provide us with reels.

I would think that in the initial set-up that we could use our own tags, bills of lading, etc., just stamping something on them.

G.E.R.: I don't think we can. We haven't room on our tag.

[fol. 5003] Ross: How does their tag read now on shipments they send down?

C.H.E.: I think it reads in poundages.

R.A.S.: The specifications will cover lengths of lay, direction etc.

Ross: That is very important and also the question of diameter. Remember when we figured that over-diameter of one millimeter cost us 80,000 pounds of copper. Glenn suggested that we might buy the conductor, just for convenience in handling the accounting for such things as scrap.

R.A.S.: We will have to follow ASTM as to specifications.

G.E.R.: That won't be enough when it is a question of getting down to minimum.

R.A.S.: That's right, I meant on an average.

Ross: There experience is in selling by the pound. That is the way they will sell to us. We will sell by the foot. That means diameter is a vital factor for us.

G.E.R.: Every product except triple braid will be sold by the foot.

C.H.E.: Is there any possibility of handling it on a pound price, as we have discussed, in weatherproof.

J.H.D.: Couldn't they sell to us by the foot.

Ross: They could not do it on solid.

R.A.S.: We plan to set up specifications based on ASTM. Then we will have the laboratory inspect as if they were raw materials coming in. If they run heavy we will have to work out an arrangement with them.

Ross: That should be made definite in talking to them. Glenn, Max Noyes gave Fred a book. I would like to find out what we would have to do to sell ACSR that they manufacture.

G.E.R.: We would have to get an allocation from the Aluminum Division.

Ross: Can't we act as sales agent for the Aluminum Company?

G.E.R.: How do they want test reports handled, on Rome Cable forms?

[fol. 5004] Ross: This is a good point—will you make a note of that.

On publicity we have heard that someone learned that Aluminum Company had a second quarter allocation of

250,000 pounds for insulated wire and that some person objected saying that Aluminum Company only had capacity for insulating about 60,000 pounds. An Aluminum Company representative put a hypothetical case to NPA and got the answer that approval of a toll arrangement would not be necessary. There might be some considerable backbiting if the publicity is not handled correctly and even if it is. We certainly have to make an announcement to our sales personnel and also to our supervisors. Should we make an announcement to the trade papers? Glenn would you want to take over with Gerry working out a possible joint announcement?

C.H.E.: Isn't the announcement really that the Aluminum Company is going to sell insulated wire?

R.A.S.: In the first few months we won't have any aluminum to sell; we won't have any ACSR,—does it need any more than a simple announcement that they are making insulated line wire. That was my understanding.

Ross: It's not just limited to that and I would not limit ourselves that way. Putting yourselves in the position of a reader—wouldn't they ask how long this arrangement will continue.

C.H.E.: I understand that we will make any type that they want.

Ross: I made a definite statement at the Directors' meeting last Friday that this would stall our own aluminum project.

Ross: I judge that the sense of the meeting is that there should be a public announcement by ALCOA and that we would follow-up with an announcement that we had made arrangements for the sale of ACSR. I would think that the announcement would say something such as—that there was a great demand for aluminum products and that to meet the demands arrangements had been made for us to make the products for them.

C.H.E.: It could also say that this would be in line with the policy of making better use of existing equipment.



[fol. 5005] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 75

Aluminum Meeting Held March 10, 1952

Present: Messrs. A.D.R. Fraser, C.H. Ellis, J.H. Dyett, R.A. Schatzel, F.S. Marks and G.A. Weiss.

Ross: This meeting is for the purpose of bringing the story up-to-date.

Glenn and I had a very satisfactory meeting Friday. They concurred in the arrangement we proposed, with the exception of paragraph 4, which was the one requiring that the Aluminum Company take all their requirements from us. Their lawyer refused to agree to this. They also asked for a longer time on revision of prices upward and we agreed to thirty-five (35) days. We tried to get them to go on a price in effect at time of shipment. They would not do it and explained that this was because it would be inconsistent with their present invoice policy. So we may have a little trouble on that point.

We both initialed the same memo. Jack has additional copies in the files. I would suggest that only those portions relating to the respective departments be kept in the department files.

We will prepare copies of their announcement to their people. They accepted our letter with two changes. The release time will be Friday. Charlie will handle the meeting with Jack with the Supervisory and Management Bonus groups.

In the statement I would suggest that we read first our letter then their letter. I would also like to see a statement like this—Rumor has come to us that the Aluminum Company was going to buy Rome Cable. State emphatically that there was never any conversations of that sort merely a fabricating arrangement. I think it would be well [fol. 5006] if Rudy Schatzel and Charlie Ellis said a few things about the advantages in this arrangement. There should be mentioned somewhere that we will have the opportunity to get into production of aluminum wire more quickly than otherwise would be possible.

We are going to handle the arrangement on a Toll Basis exclusively. That leaves one problem, what happens to scrap? In the figures that we had, we assumed that we had to buy the equivalent of 6% more of aluminum. That was assumed in calculating conductor costs, so we had scrap in the costs. Under this arrangement there will be a reduction in costs. Now we don't know whether they are going to ship us 106 or whether we give them footage production by 94%. I would presume that they expect to ship 106 and we to ship scrap back to them.

We told them that for two or three months we would try it and then see how things look and then we would make an adjustment.

R. A. Schatzel: They want to know what they are going to do with the scrap.

F. S. Marks: We are sending them some tomorrow.

Ross: I would suggest to Manufacturing, Research, and Engineering that the individual cost cards be rechecked, having in mind what changes in production can be made; if we have cheaper neoprene; in running speed; and generally what changes can be made all along the line. Let's not forget that with Kaiser's price approval we will have quite a "rat race". Any improvement to reduce cost is extremely important. (Read revised schedule of sizes and types on the first 50,000 pounds). That the amounts are not good running amounts. If you want these can be varied. [fol. 5007] Coffin should be contacted. I have put a copy in Ken Murray's hands so that he can see what it will do to the operating schedule.

R. A. Schatzel: We have started some data on engineering specifications.

Ross: There have been no prices filed on Polyethylene by size. Calculations of price purely by formula results in prices higher than Neoprene, except in two cases. We will use the same prices as Neoprene.

Rudy, in the light of what has been done on reduced diameters on Neoprene, can something be done on Polyethylene.

I expect this afternoon to go over with Fred and Ken Murray the formula basis we have used in arriving at prices; so should there be ceilings filed we will have the mechanics here to produce the prices.

Gerry, in the light of the toll arrangement should we file prices?

G. A. Weiss: Yes.

Ross: We might try a hypothetical question on this.

I have told them that for the next two or three weeks they should call Jack Dyett, Charlie Ellis and Fred Marks.

During the trial period let's have suggestions on improving procedure.

R. A. Schatzel: Massena said they did not know what to do with scrap.

Ross: Coffin was sure they had a means of taking that off with some kind of buffing, some way of stripping Polyethylene and Neoprene off.

How long will it take to set up new standards on Polyethylene?

[fol. 5008] R. A. Schatzel: A.S.A. have new standards which I think are in line with what we gave you, but we don't know about commercial standards.

Ross: Keep Jack posted on all developments.

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[fol. 5009] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 76

This Copy for Mr. E. J. Holcomb

Internal Correspondence

March 14, 1952.

From: Philip T. Coffin, Pittsburgh Office.

To: All District Sales Managers.

Re: Covered (Weather-Resistant) Conductors

Mr. Wilmot's memorandum of February 28, 1952, stated that further information would be forthcoming on the subject of covered conductors. We know that you are all anxiously awaiting details of our plans, and that with the exception of the next paragraph the following information will be gratifying to you.

Plans for acquiring necessary manufacturing equipment and plant space have been actively explored, and a number of engineering studies and cost estimates have been made. The difficulties of establishing a new plant under present

conditions together with alternative solutions to the problem have prompted us to drop plans for a new plant for the time being, at least.

In order to enter this field immediately we have just consummated what we believe will be a very happy arrangement with Rome Cable Corporation of Rome, New York. Under this plan we will manufacture bare aluminum conductors and ship them to Rome where coverings will be applied in accordance with our requirements. This arrangement is to continue for a period of not less than two years.

There are several good reasons why we are working with Rome Cable Corporation. We regard Rome as a "high quality" manufacturer. We believe that their products are the best, or equal to the best, in this field. Also, Massena and Rome are fairly close neighbors—a matter of about 130 miles by either road or railroad.

There is nothing in this arrangement which prevents us from deciding at a later date that we should have covering equipment of our own, and this has been discussed very frankly with Rome Cable. We will reappraise this situation from time to time and discuss with Rome Cable [fol. 5010] Corporation the advantages or disadvantages to both parties of an extension of this arrangement.

The covered wire and cable products for the overhead secondary distribution applications which we will obtain by this method will be shipped from both Rome and from Massena. In either case they will be strictly Alcoa products in so far as markings on reels and coils are concerned; Rome will become another Alcoa shipping point. Shipments from Rome will be managed by Massena. Of course, there will be no secret about the fact that we are having Rome apply the coverings for us. In fact, we should brag about this because Rome Cable Corporation is our choice for the best product.

It is well to bear in mind also, that Rome Cable Corporation, like many other wire and cable companies which have previously concentrated on copper conductors, is now making aluminum covered and insulated conductors. Therefore, Rome will be manufacturing similar covered aluminum conductors, and selling under their own trademarks, Rolprene, Rolene, etc. Since Rome will be obtaining aluminum



products from us for manufacturing into their own line, it is obvious that Alcoa and Rome will be selling some identical products. Rome also makes and sells many insulated wire and cable products which we do not propose to sell at the present time. The products which we will sell as Alcoa products are for the present limited to the so-called weather resistant types for overhead secondary distribution applications. These include Neoprene, Polyethylene and textile type coverings, or in some cases, combinations.

Due to Government limitations and to the newness of this project, our initial program must necessarily be rather small. For the second quarter of this year we plan to have Rome cover not exceeding 200,000 pounds aluminum weight of conductors. We have indicated to Rome that we will [fol. 5011] take in the second quarter only a rather limited range of sizes in either all aluminum or ACSR, both Neoprene and Polyethylene covered. However, we expect the program to be larger in the third quarter, and still larger in the fourth quarter.

The surplus capacity which Rome will have for our conversions naturally depends to some extent on the pattern of business which we obtain. We are assured, however, that their capacity can be increased in any reasonable quantity which we might sell, provided we give them adequate notice. For the near future the limiting factor will probably be the allocations which we can secure from NPA for the covered conductor program.

Rome Cable Corporation will supply us with technical data, specifications, etc. on their coverings. These will be issued to the Sales Offices together with our sales prices in the near future.

It is impossible to give you complete details in this memorandum, and we know that many questions will occur to you. These will be answered later.

Rome Cable is sending a copy of this letter to all of its District Offices. The counterpart of this letter, written by Rome Cable, is attached.

Philip T. Coffin.

PTC ek

cc: Assistant District Managers, Resident Managers, Product Managers, Electrical Conductor Salesmen, Electrical Conductor Supervisors.



Messrs. R. A. Hunt, I. W. Wilson, D. Wilmot, M. M. Anderson, G. W. Cameron, R. V. Davies, L. E. Hickman, J. R. D. Huston, T. D. Jolly, F. L. Magee, R. B. McKee, P. F. Bergstresser, J. H. DeKlyn, V. C. Doerschuk, J. P. Haight, A. P. Hall, H. L. Hall, E. J. Holcomb, B. H. Hosler, V. L. Kattau, J. V. Kohler, E. D. Mairs, D. L. Mayne, J. M. Mitchell, C. F. Nagel, Jr., A. B. Norton, G. B. D. Peterson, M. M. Schratz, A. J. Stewart, N. L. Tressel, H. T. Wilder, J. W. Wilson.

[fol. 5012] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 77

Date: March 14, 1952.

To: All Salesmen.

From: G. E. Rolston.

Subject: Expanded Activity in Aluminum.

You well know the rapid increase not only in demand for insulated and covered aluminum conductors but also that more manufacturers are entering this field. Our production and sale of these classes of products has been and continues to be limited by the allocations that are given to us by the Aluminum Division of NPA.

For many months we have not only been experimenting with various types of insulated aluminum conductors but have also supplied many of your customers within the limit of those allocations to us. This increasing demand has also presented a good potential market to the primary aluminum producers and some aluminum fabricators, who in general had no facilities or experience for applying insulated coverings. On our part we have had no aluminum rolling, drawing or stranding capacity and only a limited experience.

In conversations with the Aluminum Company of America from whom we have been getting our bare conductor they indicated a desire to enter the aluminum covered wire field. As a result of several very friendly meetings we are, therefore, pleased to advise you that an arrangement has been made with ALCOA wherein we will insulate their bare aluminum and ACSR conductor with various types of insulations and coverings.

During the earlier stages of this arrangement, the products which we will cover for them will be limited to the various types of overhead service conductors, including fibrous, neoprene, and polyethylene line wire and triplex self supporting secondary and drop cables. As more conductor metal becomes available, it is quite possible that additional types of wire mill products with aluminum conductor will be added to those mentioned above.

[fol. 5013] These products will be sold by the Aluminum Company and will be shipped out on their reels and with their tag markings, shipping papers, etc. Actual shipments in their name will be made from Rome as well as from a stock in Massena, N. Y. We are going to provide complete technical information concerning the characteristics of our insulations and coverings to ALCOA, and they will in turn furnish their entire field selling organization with this data.

We will naturally continue to supply our present line of insulated wire products with aluminum conductors. This line will be expanded depending upon additional availability of aluminum. We will purchase conductor for our insulated aluminum wire products from ALCOA, thereby assuring us of the highest quality of aluminum conductor, and we will be able to take advantage of their broad experience in the field of drawing and stranding aluminum wire.

We believe that this arrangement is of mutual advantage to both companies, and its administration in our field sales activity will not present any major difficulties. Our high regard for ALCOA's reputation for quality can be capitalized in assurances to our customers that the ALCOA conductor plus our insulations presents the best possible finished wire product available to the trade.

In order that there will be no misunderstanding we assure you that in making this arrangement and the contemplated increased sale of aluminum by our own sales force we anticipate adequate facilities to service your insulated copper requirements.

We are attaching a copy of ALCOA's announcement to all of their sales personnel, which indicates their viewpoint of this arrangement.

[fol. 5014] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 78

This Copy for Mr. E. J. Holcomb, Massena

November 11, 1952.

Phillip T. Coffin,  
Pittsburgh Office  
Mr. John W. Hood,  
Pittsburgh Office

Re: Weather Resistant Covered Aluminum Wire and Cable

I am a bit tardy in commenting on your letter of October 24 to Mr. Chapman. I refer specifically to paragraph 2, page 2. While I think you and I both understand our arrangement with Rome as we discussed it over the telephone, I nevertheless wish to re-state the arrangement in as much as it is not precisely in accordance with the paragraph in your letter to which I refer.

Unless there is an out and out "boner" there should never be a case where a shipment by Rome Cable Corporation would show both Rome Cable's name and our name on the product, the invoice or the shipping papers. In short, so far as our customers are concerned, if Rome Cable makes a shipment in our behalf as a result of having covered the conductor on a toll basis the product is strictly Alcoa's.

Rome Cable, on the other hand, purchases from us from time to time EC wire and cable which they themselves cover for their own account. The resulting product is strictly a Rome Cable product and should under no circumstances show Alcoa's name on the marker, the invoice or the shipping papers.

I am sure that all of our people at Massena understand this matter, but I think it is advisable for record purposes that the paragraph to which I refer be clarified.

Phillip T. Coffin.

PTC ek

cc: Mr. M. E. Noyes, Mr. P. H. S. Chapman, Mr. E. J. Holcomb, Mr. D. L. Mayne, Mr. R. T. Myer.

[fol. 5015] IN UNITED STATES DISTRICT COURT

## PLAINTIFF'S EXHIBIT 79

Meeting on Aluminum Program for Rome Cable Corporation  
Held April 3, 1952

Present: Messrs. A. D. R. Fraser, G. E. Rolston, C. H. Ellis, R. A. Schatzel and J. C. Ward, Jr.

Ross Fraser opened the meeting by stating that we should proceed to investigate the general aluminum program and the Rome company independently of the new Alcoa agreement. He pointed to Lawrence's article in today's paper which concludes that our economy is in a most uncertain and potentially dangerous position for business. The changing condition with respect to metals was also discussed. It was, therefore, felt that this was the time to raise again question of installing the Properzi equipment and the aluminum drawing equipment. In respect to a question Ellis stated that roughly \$235,000 had been appropriated for the entire program including the new Vaughn copper drawing machine which freed the old Elevator Supplies equipment for aluminum wire drawing.

Schatzel: What are the commitments that have been made to Alcoa that we need to consider?

Fraser: We have made no statement to them or commitment with respect to our own manufacturing. The agreement is that we are to get all of the aluminum requirements from them that we will insulate for their account. Alcoa knows of our plans for manufacturing rods, wire and ACSR. Tentatively Alcoa may make all of the ACSR for Rome account. However, since Rome adds nothing to ACSR this creates a problem under the Robinson-Patman [fol. 5016] Act, if Rome is to receive a better price than its competitors. The same news affects the prices for bare conductors, rods, etc.

The commitment to Alcoa is 200,000 lbs. by June 30, 300,000 lbs. for the third quarter and 400,000 lbs. for the fourth quarter, or 900,000 lbs. for the calendar year to be insulated for their account. For 1953 the allotment increases until at the final quarter it is at a 3,000,000 lb. annual rate with the total for the year 2,600,000 lbs. To do



this Alcoa has been told that Rome will expend \$50,000. for new equipment. Should their demands prove greater than those stated above then we have 90 days to decide whether Rome will expand further.

Fraser also suggested to Alcoa that their might be a mutual interest in setting up a combined property elsewhere using the Properzi equipment and the drawing equipment which could be made available to be moved on the assumption that Rome could get all of its conductor for its own account here at Rome from Massena. His impression is that Alcoa would prefer to have their own plant for rods and wire also. At present they are short of capacity in the east which includes the territory as far as Davenport, Iowa, but they are long on capacity from their mill in Vancouver for the far western territory. He, therefore, felt it unwise to pursue such a line of discussion with Alcoa at this time.

Schatzel: Then we are clear to set up the Properzi equipment for our own experiments here?

Ellis: I am not clear on some of the economic aspects involved. I have been given figures on costs from Alcoa for rods and wire. Are these firm? Such figures were practically identical to Rome figures for finished strand taking advantage of the Properzi equipment. Had we known this originally we should not have put in the [fol. 5017] Properzi request.

Fraser: If it turned out to be advisable we can always sell the equipment that we have already ordered.

Ellis: I would not want to absorb into mill operations the cost of experimental work on the Properzi machine.

Fraser: Perhaps we may want to tread water for a bit until the picture is clearer.

Ellis: From work done in the last several days with Bob Fraser and Ward we could set up the Properzi equipment for experimental work and save \$20,000. over our schedule and we could make available the variable speed drive for our insulating machine thus making savings equivalent to \$30,000. Then with six months notice we could restore the program to its original plan if it seemed advisable.

Schatzel: But how could we learn anything from the Properzi equipment without drawing the rods to wire which we would not be able to do in accordance with this plan?



Ellis: If necessary we could use the Elevator Supply equipment for aluminum drawing by putting in \$2,000 more for a dip system.

Fraser: On a 6¢ rod differential it is estimated the Properzi equipment saves 3¢. On this basis the regular Alcoa price to Rome is approximately the same as Rome's costs on the Properzi equipment with a difference of not over 5% to 8% on a few sizes.

Rolston: But what about the present Westinghouse flat sizes that we already need and are committed for? Alcoa can only furnish the rods in very small packages.

Ellis: We should order them anyway.

[fol. 5018] Schatzel: We have already sent up to Alcoa 28" reels for them to try. These give 1,000 lb. copper packages.

Rolston: But we already have 65,000 lbs. of  $\frac{3}{8}$  rods here now.

Schatzel: Perhaps we would rather send them back—to which Rolston agreed.

Ellis: Do the finished sizes run as for copper between small and big sizes?

Rolston: Yes, practically the same and we are still due 35,000 lbs. more rods for our first quarter requirements and another 100,000 lbs. for the second quarter.

Ellis: It isn't economics in this case as much as bull block capacity. We are late in getting the size distribution.

Rolston: I feel that the present system is too inflexible and we need more control over our own manufacturing.

Ellis: However, this is all a very short range picture that we are discussing.

Fraser: I understand that when Rome made its prices we were 16¢ high on Magnet Wire for Westinghouse. Westinghouse states that the aluminum is working out very well from their experience to date.

Rolston: Yes, we are also 10¢ high on copper Magnet Wire. Margins are very good and the question is, can Westinghouse afford to buy outside as against their own plant at Buffalo?

Fraser: Precisely, and how good is this business then?

Rolston: It is as good as for flat copper. Westinghouse assures us that they are going to use the output of our two glass insulating machines. When Buffalo made Sharon's

flat wire requirements about a year and a half ago they also made aluminum flats. He believes that they secured  $\frac{3}{8}$ " rods and drew them and rolled them down.

[fol. 5019] Schatzel: With Properzi equipment Rome would have the advantage of getting the desired lengths in one piece, saving scrap.

Ellis: Alcoa must equip themselves to supply us with lengths in order to save scrap. We may have guessed in advance too high a percentage of small sizes.

Schatzel: To break even on the Properzi equipment what poundage per month must we make?

Ellis: Say 300,000 lbs. The question of capacity of strand equipment is completely apart from the ACSR program.

Schatzel: So far there seems more hesitancy by Alcoa to supply solid sizes in place of 7-wire strands. It was concluded that this may be inexperience.

Ellis: Our big capacity in Rome is in Larmuth and we have approximately 5,000,000 ft. capacity still available or approximately 200,000 lbs. per month.

Schatzel and Rolston. That will be plenty up to 4/0. As far as solid vs. strand is concerned Alcoa will find that this will be specified by their customers.

Schatzel: Recent conversations confirm the fact that the use of aluminum wire and cable has been taken out of the hands of utility engineers by higher executives. Orders are out that wherever there is a 10% differential in price aluminum must be substituted for copper. The engineers feel that connectors and other problems have not been satisfactorily solved for such a decision.

Ellis: Feels that Rome has reasonable capacity for stranding needs and that this makes the Properzi process more interesting. It must be remembered that shortage in copper had a part in the original decision to fill in with aluminum. Therefore, said he, why swing from one position [fol. 5020] to the other and feel that this is the time for all of us to agree to make a thirty day decision.

Fraser: Does this mean we do not need new stranders?

Ellis: Not necessarily, but ACSR should be left alone for the present until we see how far utilities will go in substituting aluminum for copper. Then too there is the question of mill flexibility with respect to such things as

flats. Alcoa, for instance, might not be willing to put up with the sudden shifts that we are required to meet for our customers.

Fraser: On 1,000,000 lbs. per month we estimated Properzi saves 3¢ per pound. How much can we save on 300,000 lbs. per month?

Ellis: Purposely I cannot say. At Davenport Rudy and I concluded that we could make a saving of more than 3¢. We can run on one shift as a basis if we desire and manufacture a lower output. However, we believed that we could get customers for rods in addition to our own requirements.

Fraser: If so we may kiss Alcoa good-bye. We couldn't compete with Alcoa if they pared down their prices.

Schatzel: Nevertheless, we should operate the Properzi equipment to see what we can do and save.

Fraser: On 300,000 lbs. per month should we do it?

Schatzel: Do not feel that Rome should be so tied up with Alcoa that we lose control of our own production.

Fraser: We have two big gambles at present. One is the Sendzimer proces for galvanizing at Torrance. Second is our need to get into aluminum. Then came along the Alcoa agreement which must be taken into account. It is now obvious that there is no good rod source in the middle western area.

Rolston: This is all pre-supposed on the fact that we [fol. 5021] would not be eliminated from doing our own business. For instance, we get inquiries that we could not expect Alcoa to furnish.

Fraser: In any case we feel that getting the Vaughn machine was a good acquisition. We should set up the Elevator Supply machine for wire drawing though it is fully depreciated.

Schatzel: We seem to divide the aluminum manufacturing problem into two parts:

1. Drawing and stranding
2. Casting and rolling rods.

In any event we should commit ourselves to doing the first.

Ellis: Based on the fact there is reduced copper available we have a good chance of producing 5,000,000 lbs. of

copper excluding the use of the bull block. Theoretically we could produce 8,400,000 lbs. If we allow 1,200,000 lbs. for the bull block we can do 5,000,000 lbs. without the Elevator Supply machine and possibly 7,200,000 lbs. Believes that the Elevator Supply machine should, therefore, be set up in the new location for aluminum wire drawing in the simplest manner possible. This would not lead us into minimum cost processing but could be considered a transitional approach which seems desirable since every thirty days conditions seem to make a change in the picture. We must bear in mind that if we had unlimited copper and with the use of the new Vaughn drawing machine we could use all of the available stranding, in which case the transitional approach could be wrong.

Fraser: This serves to show how my mind is not fully clear what to do and I would like to hear from each one present in turn.

Rolston: I think we cannot operate properly unless we can draw and we can strand our own aluminum wire.

[fol. 5022] Fraser: But what about Properzi?

Rolston: I don't know. Perhaps do nothing unless you wish to find out what can be done with it.

Ward: It may be well to keep in mind that the Properzi equipment can be installed for approximately \$20,000 or less based on the figures worked up in the last two days with Bob Fraser. This is \$24,000 less than for the original set-up including the accumulator for continuous drawing and the variable speed drive, etc.

Ellis: Perhaps we can install the Elevator Supply machine for aluminum drawing in the "as is" condition for \$5,000.

Mr. Fraser then called on Schatzel.

Schatzel: We should have our own aluminum drawing and stranding. Furthermore, it will take six months of experimental work to get the Properzi unit operating properly. Therefore believes it should be set up at this time.

Fraser: Perhaps we should wait two or three months but agree now on doing our own drawing and stranding of aluminum wire.

Schatzel: But if we can save 3¢ on the Properzi equip-

ment why not take advantage of it. I agree we should draw and strand aluminum in any case.

Mr. Fraser then called on Ward.

Ward: I would put the Properzi machine in the designated location in a simplified manner. I would also put the drawing equipment in the simplified installation. Perhaps this could be called a temporary solution as opposed to the long term solution for reasons that have already been brought out. This would permit us to use a transformer on order for the rubber mill, saving the purchase of a transformer for the new lead press. Charlie Ellis also desires a variable speed drive and, therefore, this [fol. 5023] could also be used at a saving elsewhere. As to the Aluminum Company objecting, it is my opinion that the agreement would prove to be a bad one in such an event and, therefore, I doubt that this would come about. Furthermore, the history of Rome shows that the business is continually developing and not standing still and that with this long term objective the desirability of installing purchased equipment in the simplest fashion possible seems to be desirable and in line with best policy. Now that Rome has factories in more than one location it is too early to say where this equipment ultimately may go. In any event the assigned location is not ideal, is limited in area and under tentative plans worked out by Mr. Ellis there might be more efficient and desirable locations in the period ahead here at Rome also.

Therefore, to sum up, I would install the Properzi equipment and the Elevator Supply machine in the designated location but in the simplest and most inexpensive fashion possible feeling that the long range picture will develop as time goes on and that the least will be committed by this solution.

Mr. Fraser then called on Ellis.

Ellis: I would do the same. I get scared when I consider the Alcoa forecast on their volume.

Rolston: I question the Alcoa's market reserve. This is too big a share for Alcoa when you consider the total available market and all of the competitors.

Fraser: I agree that it is optimistic. Their claim is, however, that their market analyses people historically are within 2%.



[fol. 5024] Ellis: I am satisfied with the program at least for the next thirty days.

Meeting adjourned.

J. C. Ward, Jr.

JCW:AS

[fol. 5025] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 80

To: All Salesmen.

From: F. S. Marks—Rome.

Date: June 5, 1952.

Subject: Covered Aluminum Orders and Inquiries.

We have been informed that there is a very good possibility that Aluminum will be decontrolled for the third and subsequent quarter of this year. We do not know exactly how this will be handled at the present, but in view of this, we want to outline our policy on the subject of orders and inquiries for covered Aluminum.

Effective at once, please feel free to talk with your customers about our ability to supply covered Aluminum. We have in the past had such a small allotment that many of us probably have told some of our customers that we cannot handle any sizeable amounts for them. This is not true any longer, and we suggest that you furnish quotations and accept orders for the third quarter and later on the covered Aluminum products which we announced we would produce. We repeat these products below so that there will be no question:

Knitted or Braided Aluminum Line Wire  
Neoprene Covered Aluminum Line Wire  
Polyethylene Covered Aluminum Line Wire  
Neoprene Insulated Self-Supporting Service Drop  
Polyethylene Insulated Self-Supporting Service Drop

We cannot at this time definitely tell you to accept orders on Aluminum Building Wire, Service Cables or RR Power Cables without asking you to contact us. As soon as this decontrol policy is definitely announced, we hope to estab-

lish our policy regarding the manufacture of these three products, but in the meantime suggest that you contact us if you have any inquiries. One of the deciding factors will be the quantities involved because we cannot set up to manufacture small runs, and we are not yet in a position to produce these items on schedules.

The purpose of this memorandum is to release you from any restrictions on acceptance of orders and quotations for the products that we definitely announced we will manufacture and also to encourage you to discuss freely with your customers our ability to make these products.

Our delivery at the present time on the Line Wire and Self-Supporting Aluminum Service Drop is August.

Yours very truly, F.S.M.

FSM:dr

[fol. 5026] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 81

Minutes of Meeting Saturday Morning—January 24, 1953

Whither goest Thou

Present: Messrs. Barnard, J. H. Dyett, Ellis, Rolston, Sarles, Schatzel with A. D. R. Fraser presiding.

• ADRF opened the meeting by again stating that he wanted a very frank discussion on as many of the approximately twenty subjects he had previously outlined and that he expected to act largely as moderator. Many of the questions that he might ask largely to bring out the discussion might very well not even reflect his views.

The first subject for discussion was "Shall we continue the Alcoa agreement?" ADRF outlined the many complaints from quite a number of people in the organization on methods of handling the Alcoa business. In view of the fact that the contract will be about a year old by the end of March and Alcoa themselves will probably be reviewing their position he felt it wise for us to know where we stood because we had promised to give them at least a year if we decided to give up the agreement.

Glenn opened the discussion centering first on the competitive situation and the problem of our selling to the same customer. He outlined in some detail the difficulty of getting Alcoa to think as we do. For forty five years they have largely done as they pleased in the sale of aluminum. Their sales or pricing policies have been extremely loose. They have had very arbitrary distribution policies in the past and until the last five years have never sold through jobbers, at least through electrical wholesalers. It is quite obviously difficult for them to accept an established policy for selling. He feels that he is beginning to get somewhere in conversations so that they have some better appreciation for the problem. They have a different policy on selling from consigned stock. In summarizing the competitive phase GER felt he could live with the differing policies between the two companies.

ADRF had asked him to check with Alcoa on publicity covering expansion at Vancouver which might have indicated that they were expecting to put in covering equipment at that point. He reported that the Vancouver development is only expansion of their drawing and stranding departments. They now have drawing and stranding and ACSR capacity at Massena, New York, Lafayette, Indiana, Vancouver, Washington.

GER reported that Alcoa was interested in our furnishing them with a larger quantity of Triplex, probably about double the quantity we have allocated to them.

This subject was also discussed at the time of our going over equipment plans for fiscal year 1953 and we authorized another Tripler. There was some discussion as to duplicating or modifying the present type that we have. In any event, a Tripler was approved and I can report that at a meeting of our technical group earlier this week that it was agreed that we should not duplicate the present equipment but modify the design considerably. This is going to delay getting the additional capacity because there will probably be about three to four weeks of design work necessary.

Coming back to the meeting we then discussed the subject of routine handling. Here things have been in bad shape. This is the place where we have had the most complaints. We had a very thorough discussion about this

and ADRF suggested the possibility of having a committee composed of those who headed up the various sections of our company in the handling of the Alcoa business during the past year and that they come up with a procedure which to them would be ideal, which I agreed to take up with Pittsburgh. Some members of the committee felt this was advisable but others felt sufficient progress had been made so that this would be unnecessary. All of this discussion was generated from GER's remarks out of which his conclusion was that we should certainly continue the agreement, RAS was next in line and he started his discussion as follows.

[fol. 5028] One year is too short a time on which to base a decision as important as this. He feels that Rome is always going to be a customer of Alcoa for some type of product. He feels that Rome definitely needs ACSR. He stated that Kaiser, Anaconda, General Cable, Reynolds, Southern and American Steel & Wire have ACSR as well as some others and they are able to offer both ACSR as well as covered aluminum. This, of course, then brought out the fact that we were penalized in not having ACSR to include with our covered aluminum so that jobbers could get the advantage of carload rates by combining the two products. ADRF then indicated that when he went to Pittsburgh in March he would again bring up the subject of their providing ACSR on some basis. It was agreed that it might even be to our advantage in the interim period to consider a possible consigned stock here from them and our handling it without remuneration in order to service our customers and get the advantage of net carload to jobbers.

The results of the very considerable discussion were that ACSR was necessary if we are going to continue in the aluminum business, or at least expand in the aluminum business.

Charlie Ellis then held the floor and said he hoped that we could continue to keep this volume production in the plant as it was an excellent thing for us. We had gained much experience in the last year. We had volume runs that we would not otherwise have had. The three other members of the group seconded the expressions of opinion previously made and as a result I feel that the objections

which were many, even though small, are going to be faced more constructively in the future.

#### Aluminum—Properzi and Drawing Equipment

ADRF then introduced the subject of Properzi and drawing equipment in Rome. The Properzi equipment had just started operation earlier in the week. CHE said even on such a limited operation he was very bullish on the Properzi [fol. 5029] running without as many of the difficulties as some of our competitors have had. We certainly were benefiting at least up to this point on seeing Anaconda equipment running and getting the benefit of their advice on what pitfalls to avoid. ADRF asked whether, or how soon, we might be able to indicate from our initial experiments we might be ready to consider volume production because the matter of supply, not to mention where we were going to sell such volume, should be discussed and planned.

RAS asked that we be given about two to three weeks before we answer the question of when Engineering, Laboratory and Production Departments felt we might consider production for sale. This was readily agreed to.

It was brought out that the initial 30,000 lbs. that we had on consignment from Alcoa was 99.7 with .3 Boron. ADRF indicated from discussion with Phil Coffin of Alcoa that this particular grade was not only more expensive but was also scarcer. Alcoa thought that we should be looking toward the use of 99.55. It was agreed that RAS would investigate this and see what the possibilities were of our using it. There seemed to be an agreement that production at the rate of probably 1200 pounds per hour was easily possible. (Original estimate was 2000 pounds per hour.) Indications pointed to a production of about 250,000 pounds per month to operate efficiently. This presents problem of supply, particularly if 99.7 is required. ADRF then asked where the Sales Department would dispose of 250,000 per month and GER stated that we could use 125,000 per month in covered wire and 125,000 per month in bare drawn for other fabricators. Going beyond this, and to use the greater capacity of the Properzi equipment, ACSR would be the main outlet. CHE indicated that we had some capacity to do some steel stranding, or ACSR stranding rather, and we would supply the individ-



nal conductor from our own drawing. He will again review how much of this is available. GER will review potentials of ACSR from Rome.

[fol. 5030] "Whither Goest Thou"

I opened this discussion and used the strange quotation above in order to get an expression of opinion from the group as to how they personally felt about where we were heading in Rome Cable. The importance of our determining just what our best thinking was on this subject would determine whether we stumbled into the future or whether we planned for it. I also indicated it could have quite a considerable effect on the group as individuals as well as the Company. Were we interested in carrying on our meteoric rise which might even be considered as potentially continuing if we listened to the estimates of the future or were we interested in staying just a medium sized Company maintaining all the current high standards and keeping up to date but, of course, sacrificing volume. I particularly stressed the ever westward growing center of population, the very important factor of freight, as well as a number of other factors which penalized a plant having only one location. I also brought into discussion HTD's mention at various times of the potentialities of a branch plant located at Texas. I further indicated that certain preliminary studies had been carried on regarding locations in Texas. I also indicated that certain freight studies were in process of compilation and review. HWB expressed himself that if we expand he did not feel that Rome was the place and that if we stopped growing we would probably slip backwards. He preferred to reserve his decision or recommendation until more facts were available. Rudy indicated that he did not feel we could stop growing, that we should continue to grow in Rome, that our entry into the utility field was important and that that line could be further expanded. If we go outside of Rome that should only be done after a very considerable study. We must determine whether we are going to meet competition all over. He brought out that Magnet Wire expansion cannot be done in Rome, aluminum expansion cannot be done in Rome, and Electronics, particularly in the communication field, cannot be done in Rome. He felt that being the kind

of company we are that both expansion in Rome and at [fol. 5031] some outside point or points was a natural evolution.

I called on Glenn Rolston next. He indicated he was more of a conservative. He did not feel that the use of kilowatt hours as a growth factor is going to continue to be proportionate in the use of wire and cable, that utility central stations did not use as much wire and cable as they did years ago. He favored consolidating our position here in Rome and that as he viewed the competitive picture there were probably some products in our present line that we may have to discontinue making, but he also added that there are other types of products that will probably use that equipment and that proper studies should be made accordingly. With particular reference to the utility field he indicated that Bare and Weatherproof were going to be unprofitable in certain districts and that we would probably have to retire from competition in those districts. We should concentrate, therefore, on power cables and other specialized items. We should promote aluminum, assuming that Rome is the place to do so. He felt that not only as far as products were concerned but we should consolidate our position as far as individuals were concerned. He felt that in the rapid pace we had been traveling in the last few years that of necessity we had all lost a considerable touch with certain important phases of the operations. He dreads the thought of expansion other than at Rome. He urged greater reworking of our product. On ACSR he thought that if we were limited to Rome we would only be able to do a job in a very limited area. He questioned expansion of facilities. We should improve methods and reduce costs.

Charlie Ellis was next and he said that if past history was any criterion he does not believe that the basic dynamic spirit on which we were founded and have exhibited since the start could be changed. We will have difficulty in saying "no" to opportunities that are thrown at us. He agreed that we would carry on refinement in our present product line and attempt to improve. His bet was that we will expand. He also felt that we must look toward still making big outlays of cash for equipment to take care of changes in product mix or improve production methods.

[fol. 5032] More and more as we have established our reputation will the kind of opportunities be offered to us which are a challenge and which we probably will not be able to resist.

Jack Dyett indicated that on the basis of past experience, that while we thought we wanted a relatively small company, we seemed to have had expansion whether or not we wanted it and he cited Torrance, aluminum, Spiral 4 as examples of this particular point. He personally is for normal expansion, urged that in keeping with our earlier meetings that we get our organization in shape to meet the future so that we might be better prepared if opportunities develop. We should view the immediate future considering timing as being one of the important parts of it. He felt that perhaps we might continue our expansion trend possibly two or three years from now. He urged that we look at expansion but, like Glenn, that we consolidate first.

Jay Sarles indicated that there was gold in the hills in the expansion program that we have had and have carried on for some time. He stated that he preferred one operation here on wire and cable with better cultivation of our present facilities. Summing it up, he favored modified expansion here at Rome.

In summing up the views it must be borne in mind that these views were expressed without any supporting data on freight or profits or any other information. It was merely my questioning them about what their thinking was regarding their hopes or thoughts for the Company in the future. Summing it all up, they agreed that Charlie and Rudy were more inclined to expansion outside of Rome, while agreeing that we should consolidate our position in Rome. Rudy, of course, indicated that there were quite some considerable places for expansion here in Rome on our present line. Glenn, Jack and Jay were more inclined to modified expansion in Rome. Harry, as indicated, desired to reserve his vote.

In any event, discussion brought out that we were not going to exactly stand still so I then asked whether any of them had any thoughts of what we should do regarding [fol. 5033] our organization in order to prepare ourselves better for what seemed to be our future destiny. Jack suggested that on students where we had agreed in our

organization audit that we needed more, that we should start earlier and provide opportunities. Charlie felt we needed more assistants for top people. Glenn was somewhat worried about our method of training men. Harry thought the President needed more assistants. The President felt that there should be more attention paid and the staff built up to handle such things as public relations, administrative assistance, market analysis, sales promotion, expansion of internal sales, expansion of interpretation of reports and that we plan our training program better for employees and for supervision.

The meeting adjourned at 1:45 'til 9:30 Sunday morning.

Meeting—Continued January 25, 1953, Sunday Morning  
Session

Before we started on our main subjects for Sunday morning I introduced the subject of excess profits tax money. I indicated that we had embarked on a program with Cornell and started a movie and certain other projects, having in mind carrying on the investigation during this particular period hoping that results would be forthcoming or at least trends indicated by the time the Excess Profits Tax expired. I stated that we all believed that taxes would undoubtedly be high for a considerable period of the future and that we should possibly explore any other items that would fall into the same category as those previously started. I particularly brought up whether we should expand our outside research contact. Rudy answered promptly by saying that expansion must not mean dilution. A strong central core is necessary for research. He felt that we should draw on outside services for the "dreamer" type of research. He is not interested in a divorced central research. He further expressed himself as feeling that we should not tie our- [fol. 5034] selves wholly to one university, that there were many opportunities for specialized work with other fine technical institutions. In fact, he brought out that Dr. Winding in his work with us was also using the technical facilities of certain other institutions in order to get the best help on some of our problems.

The only other remark made at this point was that Charlie Ellis felt that if we were carrying on any expan-



sion program or looking for expansion in some other location we might carry on some of the engineering work and get some outside help so that if the decision was ever made to actually do the expansion all of the preliminary work would have been done.

#### Capital Expenditures for 1953 Fiscal Year

Charlie Ellis then took the floor and said that in presenting the report we could look at the minimum recommendations of the Rome Engineering Department for that plant at somewhere around \$450,000, but they also had a program that would run as high as well over \$1,800,000. He then reviewed in detail the recommended items on the smaller program. Copy of the detailed report is attached. As you review the maximum total suggested I think you will be impressed, as I was, with the very sizable amount of buildings and the relatively small amount involved in increased capacity. The items marked "X" on the exhibit were the ones recommended for prime consideration in the new fiscal year. Going down the line on "Class 1—Primary Capital Items" you will note an item of \$106,550 to get a new superstructure in Building 1. This is the present Shipping Room which is in bad shape and calls for some building out over the tracks. The third floor office section expansion over Building 15, the present Conference Room, Production offices and Laboratory, has a counter-suggestion of making a separate Laboratory and turning the present Laboratory over to Production offices and other uses. As a means of providing room suggestions were made in lieu of this suggested expansion program that some of the Laboratory be [fol. 5035] moved over to the old office which would relieve some congestion. I also suggested the use of certain portions of the Spiral 4 offices which would not be used with the reduced schedule there. The program calls for 14 new fine wire machines which would give us about 80 to 100% of our present capacity with new fine wire equipment. Our costs are high on this particular product, as you know. It was also brought out, however, that many of our present fine wire customers had installed their own fine wire equipment and that we might not have as sizable a market in the future and that study should be given to this. A more intensive study of Cooke annealer should also be done.



When we reached discussion of the Laboratory it was brought out that the current list as submitted did not contain the requested items for the Laboratory for 1953. This would add some \$20,000 to \$25,000 more. When we came to the Compound Department I think I told you that certain special recommendations were being made on that but which had not been resolved so that will await future developments. Likewise, it was brought out, as I mentioned in the Aluminum report, that Alcoa now wants a million feet per month of Triplex wire. This would mean adding another Triplex machine. Discussion ensued during the morning as to the type of machine. I have already brought out that we need modifications on the present type and that the Engineering Department will design a new machine. This, however, will delay our increasing our capacity by several months.

On "Class 3—Capital Items of Experimental Character", Charlie included the Synthanol project of replacing 50 h.p. motors with 100 h.p. motors on Plastic Extruders #4 and #5 and replacing a 20 h.p. motor with a 30 h.p. motor on Extruder #65-3. This would cost \$24,000 and was included in the overall total of minimum expenditures. This program alone would save \$50,000 a year.

The controlled temperature feed for C.V's and plastic compound powder mixing and extrusion also included under [fol. 5036] Class 3 were recommended for inclusion in our program.

"Class 4—Capital Items for Future Consideration" carries the recommendation of \$100,000 for 10 Vaughn fine wire machines as worthy of consideration in the new fiscal year. I have given you our discussion on the ACSR and you will note that that involves an expenditure of \$285,000. I believe that while our other discussion indicated the necessity of having ACSR in our line, we had other considerations brought out that should be explored first before any decision is made.

After Charlie finished we had a general discussion and I mentioned that I felt the trend was going towards need of more cabling equipment and that we didn't have proper ranges. We either had good equipment for small or good equipment for large, but that we were out of the competitive picture on certain intermediate items. Rudy brought out

that more tank test room was needed and that three new sparkers, Entwistle type, at an estimated expenditure of \$15,000 were quite essential. We urged that a good floor area study should be made with particular reference to the demands for the Spiral 4 building. We discussed the advantages of closing Henry Street and connecting Spiral 4 with the present Insulating building. I asked that the factory and plant engineering check with both research and development engineering as well as the Sales Department as to new products and added capacity for present products in their viewpoint for the future.

We next tackled the question of Torrance requirements for fiscal year 1953. Their original request amounted to \$151,000 which we cut down to about \$35,000 as items that should be considered for the new fiscal year. We definitely felt that any other expenditures should await the results of the actual production of the hot dip rigid.

As you can well see from the above and the perusal of the items submitted this was quite a session in itself.

[fol. 5037] Subject: Torrance

I opened the discussion on Torrance by referring to our Organizational Audit meeting wherein we had very thoroughly discussed the question of top management at Torrance. Various names were suggested in the event of an emergency in that meeting.

I stated I wanted to have a very complete discussion of Torrance problem because I knew it was thought of by some as "Fraser's Folly". I indicated I planned to go to Torrance early in March and read copies of both Art Andersen's and Gil Woodill's letters of reply to my letter of January 2nd. I expressed the feeling that if the production troubles on rigid were reasonably well in hand by that time I saw very little problem about coming to some agreement that would make everybody's life much easier. I stressed the size of the investment which we had there and regretted that we had no projected costs on rigid to indicate potential profits. These are being prepared and should be in my hands by the latter part of the week. These have since been received and are being studied. There is some amount of discouragement in them but also some amount of encouragement. Both Charlie and I feel

that they are ultra conservative. Continuing the meeting Charlie Ellis suggested that possibly some one could be brought to Rome to get further indoctrination in our management policies. He also suggested the possibility of getting a conduit man and integrating him to our policies or possibly getting a Rome man and integrating him to conduit problems. Jack suggested that it might be better to have someone from Torrance coming here more frequently and staying longer. Charlie felt it would be well in their present production difficulties to keep away from there at the present time.

[fol. 5038] I really started some very serious discussion when I asked whether the amount of discouragement that we had had on Torrance indicated that we should sell it. I told them I felt that I could think of at least four people who would definitely be interested. This suggestion was greeted by a resounding "No" from the entire group. Glenn feels that he needs it as a product in order to keep down the overall cost of his Coast operations. Rudy felt that it provided a good base for Coast operations. The importance of improving their quality control was stressed and Rudy reported it is under way. After all the discussion it was felt that the present method of contacting be left as is, but that on production matters, rather than Jack and Gil discussing the differences those should be referred to Charlie and he taking them up with Art.

The difficulties of operating with a three thousand mile space difference were stressed.

I asked how important the lack of sizes above 2" would be. GER said that it will be a big problem on individual projects. I then asked whether we would be interested in getting some one to supply us with sizes above 2" for the West Coast, whether we would be interested in having conduit available in our Eastern operations in making an arrangement with a supplier, whether we would be interested in making the West Coast needs of that supplier, whether we would be interested in selling a portion of our output to someone like Essex for example. I also asked whether we would be interested in production of mechanical tubing.

In answering these questions it was brought out that as far as not having the sizes above 2" are concerned we


are always dealing with the jobber and we would only get a certain percentage of his business anyway. O. I. Lewis is going to the Coast for a trip in about three weeks and he expects to evaluate this question.

[fol. 5039] On the question of manufacturing for another on the West Coast GER felt that he would prefer to capitalize on our location ourselves. He does not want to manufacture for Essex.

The question of mechanical tubing is being studied but to date he felt our costs had been out of line.

Before adjourning the meeting on Sunday morning I stated that I had several answers to my letter of January 2nd wherein suggestions were made to reinstitute the old Planning Committee as such. Perhaps with not as frequent meetings but to get together in the larger group. I pointed out that in the past while all the members of the Committee indicated that they would make suggestions for an agenda, generally the agenda was left entirely up to me and in many cases we were educating quite a group on various company matters and that in doing so our progress and our results were frequently slowed up. I had also had the criticism some people had resented the feeling that they were being placed unnecessarily on the spot before too large a group of people. The Executive Group at the meeting felt that the smaller group was much better and it was their responsibility to see that their assistants were kept informed, rather than adding that to my responsibilities. Noble resolves were made in that direction.

Meeting adjourned at 1:45 with the general expression from every one that the group meetings had been highly successful and they were ready to tackle the other sizable number of questions as soon as a mutually convenient time could be arranged.



[fel. 5040] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 82

April 7, 1953.

Mr. Ralph V. Davies, Vice President,  
Aluminum Co. of America,  
801 Gulf Building,  
Pittsburgh 19, Pa.

Dear Ralph:

This is the first opportunity since I got back to sit down and summarize some of the things that we talked about last Wednesday. I will not attempt to cover Messrs. Rolston and Schatzel's visit to your Kensington Laboratory, but I do know that they were very much impressed and felt the trip was very worthwhile. I, too, can say that about Wednesday's visit.

As you recall I opened the discussion with the desire for the usual frankness regarding our mutual agreement. I believe we both recognize that up to the present time it has not been as profitable as it can be for either party. I think we both entered the agreement with the thought in mind that there would be a period of experimentation, with our getting acquainted with the running of aluminum and your getting acquainted with the covered wire and cable industry.

We recognize that your organization must of necessity keep abreast of developments in our industry and it is our job to sell you on our ability to manufacture your requirements on a profitable and friendly basis for both parties.

I gathered from expressed opinions that you had no immediate idea of embarking on your own manufacture and that the present agreement did not require another extension and was adequate for our present needs. The volume as estimated by Phil Coffin would run somewhere near 3,000,000 pounds of bare conductor for the current calendar year, which is the same as was estimated a year ago. He brought out that his sights had been raised on Triplex to approximately 1,000,000 ft. per month, which would need from 80,000 to 100,000 pounds of bare aluminum and he estimated Neoprene Line Wire at 150,000 to 200,000



pounds of bare aluminum. He indicated that just as we have found the situation he was more pessimistic about Polyethylene. We discussed the possibility of our furnishing you a special textile type that might run to several carloads per month for American Gas and Electric or similar customers. I indicated that we would probably give you a price on textile covered aluminum that would obviate your operating your small department at Massena, should you so desire. On the subject of Building Wire you indicated that because of its manner of distribution this was a field where we should do the developing and selling and that you had no intention of entering that field at the present time.

We brought up the subject of the heavy stock and large amount of our shipping space now presently used in carrying that stock for you. Phil indicated that you expected to release half of that stock from Rome and will try to plan to keep the stock at about 2,000,000 ft. in the future. While we were on the subject of supplying material we raised the question of extreme scarcity of Neoprene. If we find we are unable to better our supply we will get in touch with you in an effort to get some allocated to us for your needs.

[fol. 5041] We brought up that we still did not know the real evaluation of the scrap which was on hand at Massena and Phil promised to follow through and get us some decision on that.

We discussed the matter of longer lengths on reels as supplied by you and we understood that there is some possibility of your sending us 30" reels but that the investment for larger supply reels would cost \$25,000. We did not attempt to cover details in the larger meeting but touched on certain problems that we had had on deliveries, damaged shipments, specifications and a number of other misunderstandings. Out of all this there came an indicated need for a good liaison man for ALCOA, first talked of as being located at Massena but later in the afternoon suggested as one possibility for Rome. We indicated that we would be glad to do everything possible to train such a man in the practices of the industry.

At lunch I brought up the subject of ACSR and out of that came a very considerable discussion. 1) by the use

of the Properzi equipment we could make a limited quantity ourselves. 2) a toll arrangement similar to the covered toll arrangement you have with us might be worked out in reverse.

I then brought up the fact that perhaps if we operated from pig on consignment using the Properzi rolling and our drawing equipment with longer lengths plus certain other changes that we were making in our covered processing we might be able to come up with a packaged proposition on covered wire, which would be more profitable for both parties. We are making some preliminary studies on this possibility and will get in touch with you when they are completed.

We discussed the matter of a long term contract for pig and after learning its purpose we agreed to send in our contract and estimate that it will run from 250,000 to 350,000 pounds per month.

We had some other discussions regarding your being able to supply us with a conductor to compete with a new Kaiser product, similar to Aldrey, being used in self-supporting cable and Phil Coffin and Max Noyes went over the matter with Rudy and Glenn and suggested a program involving certain samples from you.

I think this about covers the main items that we discussed. Again, thank you for a nice lunch and a very pleasant and constructive day.

Sincerely, — — —, President.

ADRF/m

[fol. 5042] IN UNITED STATES DISTRICT COURT  
PLAINTIFF'S EXHIBIT-83

May 4, 1953.

1952

### Research and Engineering

During the year progress has continued in the improvement of our products and wider acceptance in utilities and important industrial fields. While the shortage of metals have sometimes handicapped, we have attained a recognition in the chemical and petroleum field which promises to de-

velop. Our Laboratory has made excellent progress in the investigation of the many new synthetic Polymers and in adapting them to our uses, as well as to investigate and adopt new processes for our production. Among these, while still under development, we may mention cold feed of rubber compounds with the elimination of warm-up mixing, the continuous casting and rolling of aluminum rod, and the powder mixing of plastics. This year has also seen our production of Silastic insulated wire and the completion of extending our range of sizes of glass covered Magnet Wire to smaller sizes as well as the production of considerable amounts of aluminum glass covered Magnet Wire. We make no prediction of the future growth of aluminum in this field, but we are prepared to explore and take advantage of any trend.

Our department has supplied Sales and Manufacturing with Technical Service in the form of data, Sales Bulletins, etc. We acknowledge the excellent cooperation received from all departments. A few of the more important items are listed below:

1) Aluminum—Continued expansion of sizes and types of products. The initial development of continuous casting and rolling of aluminum. This is still in the pilot plant stage. Development and production of glass covered Magnet Wire. Obtained approvals of Service Drop Cables from REA.

2) Rome 60—Completed development of rubber jackets and insulation to comply with low-temperature requirements of Air Corps and obtained approvals under Military Specifications. Offered and accepted business (Lincoln Electric) on lower cost Welding Cable. Extended Rome 60 (CV) to include 4 conductor #12 AWG.

3) Magnet Wire—Extended range of glass covered Magnet Wire from #14 through #22 AWG. Cooperated with and obtained approval of ASEA for Glass Magnet—Aluminum Glass Covered Magnet Wire.

4) High Voltage—During the year signed a license to operate under patents on Strand Shielding (License under Peterson Patent). Recognition of our RoZone insulation was continued as evidenced by our supplying in a wider area both Control and Power Cable up to 15 KV ungrounded [fol. 5043] neutral.

5) New Processes and Equipment—We completed an investigation of our recovery of copper from Rod Mill wash water with the assistance of our Research Consultant at Cornell University. Recommendations for installation of equipment were made in cooperation with our plant Engineering department. When complete the savings in copper will be sufficient to pay for equipment in about a year and at the same time overcome a troublesome problem of stream pollution.

Our Properzi Continuous Casting equipment was installed by our plant Engineering department, and has been operating as an experimental development unit by our laboratory. Much time and study were given to the selection of equipment and its installation by Mr. Fraser and Mr. Fidler of the plant Engineering Department. Because of this and the cooperation of Anaconda in permitting our men to study and witness the operation of similar equipment in their plant, we have been enabled to greatly reduce the time of actual reduction to practice. There are still many problems to be solved, and improvements in the way of refinement and instrumentation to be made. The equipment is producing and it is planned to turn it over as a production unit on July 1.

The installation of new continuous lead press is complete and operating. Its use will permit extending our lengths of lead covered cable, and reduce the patching of larger sizes of rubber sheathed cable with a consequent improvement in quality and cost.

We have been investigating the Cold Feed process as developed by Western Electric Co. for about two years. This has required changes and development in equipment, in processes, and in the compounds used. Through the use of this method a step in the processing of rubber, warming up, is eliminated with elimination of rolls and floor space. It also permits close control of dimensions and consequent saving in material. Our first unit is now in limited production.

6) Among the new products developed and approved are some which as yet have not entered our commercial picture to any extent but bid to do so during the coming year.

Underwriters' approval of an all plastic type of Barn Wire (RoBarn) has been obtained on a design developed

and submitted during the year. This is lower in cost than our present RoBarn. At the May 18 meeting of NFPA it is expected this type will be approved as a new type of underground feeder (Type UF).

[fol. 5044] Approval of Government departments has been obtained on the four most popular sizes of High-Frequency (RG) Radar Cables. A new multi-paired Polyethylene insulated Telephone Cable line for pipe lines and certain REA uses was completed and approved.

7) We would like to again mention Spiral 4. While the volume of this product has decreased, we have maintained a high standard of quality and efficiency. This has recently been recognized by the Signal Corps in accepting a Manual of our inspection prepared at their request, and in placing Rome Cable on reduced inspection. We are proud that Rome Cable is one of the first companies manufacturing any product for the Signal Corps which has been accorded this recognition and confidence.

General—With the elimination of controls we are already conscious of the increased tempo of competition, both in costs and quality. Increased supervision and facilities in our inspection department, have been provided or are planned. Many new suppliers of established materials or of new materials make their appearance. While there have been two suppliers of Polyethylene, plans are now completed so we know we will have seven producers. Other companies are entering the field of Silastics. With the turning over of synthetic rubber to private industry new problems will be presented. Our laboratory is alert to these developments, and plans to cope with them. In this field we have the assistance of our Consulting arrangement with Dr. Winding of Cornell.

During the year an Industry Standard for Butyl Rubber insulation was adopted by IPCEA. We are prepared to furnish in accordance with this; while there was efforts made at standardization of several other specifications, progress has been disappointing. The years ahead will be one of even greater activity in this direction.

Two years ago the Industry (ASTM and IPCEA) adopted specifications for moisture-resistant rubber which appeared in Rome Cable specifications first in 1946. In our high-voltage specifications in 1947 we were the first to in-



clude a requirement for corona-level requirement, by equipment developed by our engineers. During the year we have been pleased to see this method adopted and advertised by the largest electrical manufacturer and one of the principal utilities, so that it is gaining wide recognition by producers and users alike. An industry committee has been formed to draw up a recommended Standard of Corona-level testing.

Rome Cable Manual published in 1947 has gained nationwide recognition, and is known in many countries. Plans are under way to revise and bring this up to date for publication early in 1954.

[fol. 5045] We have had one patent No. 2,635,136 for Sparking Equipment issued in 1953. We have issued a license for a manufacturer to make an improvement on continuous vulcanizing equipment, on which a patent is pending.

R. A. Schatzel.

RAS P

[fol. 5046]

U. S. DISTRICT COURT

PLAINTIFF'S EXHIBIT 84

# ROME CABLE CORPORATION

ROME, N.Y.

REPORT SUBMITTED TO THE BOARD OF DIRECTORS  
OF ROME CABLE CORPORATION AT THEIR MEETING  
SEPTEMBER 2, 1953

I present herewith net sales and earnings by fiscal years up to March 31, 1953, the April-June quarter of this year and also the month of July:

<u>Fiscal Year Ended</u>	<u>Net Sales</u>	<u>Earnings</u>
March 31, 1937	\$ 1,798,092	\$ 1,436
March 31, 1938	4,957,303	71,087
March 31, 1939	5,370,665	265,036
March 31, 1940	6,080,902	297,736
March 31, 1941	9,465,451	431,501
March 31, 1942	11,631,785	592,135
March 31, 1943	12,712,333	367,664
March 31, 1944	16,909,735	446,789
March 31, 1945	22,796,218	486,653
March 31, 1946	16,975,009	394,973
March 31, 1947	18,436,305	1,359,393
March 31, 1948	25,202,853	1,352,579
March 31, 1949	26,088,523	1,115,960
March 31, 1950	19,602,984	302,209
	Add: Portion of metal profits set aside in prior years to offset copper loss	150,000 152,209
March 31, 1951	35,142,901	\$1,922,136
	Net Transferred to earnings retained	150,000
March 31, 1952	42,657,848	1,772,136
March 31, 1953	54,632,976	1,753,651
April - June Quarter	13,858,372	2,008,321
July	3,289,935	584,190
Total 4 months	317,148,307	71,483
		\$415,673

It will be noted that the sales for the first four months are at a lower  
pace as compared to last year. The uncertainty overhanging the copper market

[fol.5047]

**ROME CABLE CORPORATION**

is apparently a deterring factor and our customers appear to be holding down orders until prices appear firmer.

Torrance P and L figures for the first quarter of this year show a net loss of \$12,926, but with July sales of \$402,903 a small profit of \$1,446 was made. Sales in August were particularly disappointing. More about this situation later.

The breakdown of sales April to August 31, 1953, with August figures estimated, are given below:

	<u>April-August - 1953</u>	<u>April-August 1952</u>	<u>\$ Increase or Decrease</u>
Rods	\$2,583,000	\$2,317,035	11.5%
Bare	3,137,000	2,285,832	37.2
Weatherproof	1,330,000	1,319,617	.8
Magnet	1,369,000	1,371,017	-
Rubber Covered	8,355,000	8,050,407	3.6
Torrance - K.M.T.	1,106,000	1,211,362	( 8.7 )
T.V. Mast	234,000	-	-
Spiral &	2,781,000	6,211,024	( 55.2 )
Aluminum	936,000	523,802	78.6

Figures on investment and net return on investment are shown for the last three years on both the Rome and Torrance Plants as follows:

	<u>March 31, 1951</u>	<u>March 31, 1952</u>	<u>March 31, 1953</u>
<b>ROME PLANT</b>			
Investment	\$10,474,000	\$10,578,000	\$10,808,000
Earnings	1,798,000	1,614,000	1,993,000
% Return	17.2%	15.2%	18.4%
<b>TORRANCE PLANT</b>			
Investment	\$2,206,000	\$3,496,000	\$3,821,000
Earnings	124,000	139,000	15,000
% Return	5.6%	4.0%	.4%

Inventory investment at our Torrance Plant is shown below, which indicates a growth of nearly \$600,000 in inventory valuation since July 31, 1952.

	<u>July 31, 1953</u>	<u>March 31, 1953</u>	<u>July 31, 1952</u>
Cold Rolled	\$529,159	\$159,807	\$381,944
Hot Rolled	737,461	626,741	349,710
Zinc	117,819	106,748	67,480
Other materials, Labor & Expense, etc.	<u>116,297</u>	<u>302,544</u>	<u>117,244</u>
	\$1,700,736	\$1,195,840	\$1,136,398

In addition to the above inventories we have authorized consigned stocks of \$260,000 of K.M.T. and \$258,000 Rigid, a total of \$518,000. I am told that these stocks are necessary under present conditions in order to promote sales.

[fol. 5048]

## ROACH CABLE CORPORATION

The backlog of orders is as follows:

		Quantity-Pounds	Value
January 30, 1953	Wire & Cable	13,966,000	39,290,000
	Aluminum	878,000	753,000
	Spiral &	1,407,000	8,775,000
	Terrance	-	266,000
May 31, 1953	Wire & Cable	10,971,000	7,039,000
	Aluminum	660,000	483,000
	Spiral &	963,000	5,406,000
	Terrance - RMT	-	3,600
	Rigid	-	219,600
	T.V. Mast	-	42,000
August 15, 1953	Wire & Cable	6,388,000	5,116,000
	Aluminum	567,000	502,000
	Spiral &	735,000	4,110,000
	Terrance - RMT	-	113,000
	Rigid	-	107,000
	T.V. Mast	-	44,700

Although the copper supply situation appears solved with most suppliers offering nearby shipment, the price confusion continues to exist. Chile has accumulated approximately 85,000 tons of copper which have been offered to the American Government at the world market price of about 29 cents a pound. However, the fabricators of the two large American companies with Chilean properties must still pay the 36.50-cent level. In this Country the producers are charging 30 cents a pound while copper can be purchased from the smelters at 29 cents and under that from certain foreign sources. After an unexpectedly low opening of the London Exchange on August 5th steady European buying has firmed the price to figures approaching our domestic quotations. In the United States, however, fabricators during the past two months as well as for September are keeping their copper purchases to a minimum.

The maintenance of high copper prices throughout the summer in the face of lowered demands has been surprising. After the Chilean stockpile is sold and its current production enters the market, I feel we shall experience lower prices. In view of this our purchasing policy continues to be conservative with all our copper on contract being bought on an average monthly figure or price in effect on date of shipment.

As a result of small rigid conduit production for the past two months, our third quarter steel orders are more than sufficient to fill our needs through December. Fortunately, most of our steel in inventory was purchased before the last steel price increase. All other materials are in ample supply to meet current requirements.

[Vol. 5049]

**ROME CABLE CORPORATION**

Factory payroll statistics for Rome and Torrance are presented below:

<u>ROME</u>	<u>Week Ending</u>	<u>No. Employees</u>	<u>Total Payroll</u>	<u>Average Weekly Wage</u>
	Sept. 14, 1952	M 1032 F 169 1201	\$87,985.40 9,781.98 97,767.38	\$85.03 57.88
	Feb. 7, 1953	M 1008 F 118 1126	85,954.74 5,460.17 91,414.91	85.23 46.28
	Aug. 16, 1953	M 1019 F 93 1112	81,260.41 5,473.59 86,734.00	79.75 58.86
<u>TORRANCE</u>				
	Sept. 13, 1952	149	13,753.67	92.31
	Feb. 7, 1953	153	11,611.82	81.20
	Aug. 15, 1953	150	12,686.04	84.57

E.R.'s approved since our last Board meeting are as follows:

<u>E.R. No.</u>	<u>Description</u>	<u>Amount</u>
1583	Purchase one Model 1250 Multilith	32,011
1584	Purchase and install an additional concentric taping head on multiple taping machine #01-23	1,600
1585	Construct and install two paper humidifying cabinets for Magnet Wire Dept.	800
1586	Purchase and install one band saw in Carpenter Shop	1,400
1587	Purchase one portable centrifugal gas driven pump	400
1589	Purchase and install 5 brazing units for stranders	1,000
1590	Purchase and install one electrically heated vacuum drying oven in Laboratory, Item #8	400
1591	Purchase and install electrically heated vacuum drying oven in Laboratory, Item #4	400
1592	Purchase and install three electric hoists	1,320
		39,341



[fol. 5050]

**ROME CABLE CORPORATION**

<u>E. A. No.</u>	<u>Description</u>	<u>Amount</u>
<u>TOTAL</u>		
C-204	Main expenditures for 1953 Furniture & Equipment	\$2,000
C-205	Purchase a 9,000 CFM zinc dust exhaust and collecting unit	5,390
C-206	Purchase one 1951 used "Krane Kar" mobile Swing Boom Crane Model AY	8,755
C-207	Purchase spray showers, etc. to be installed along the electro-plating line	1,500
		\$17,645

The following Additional E.R.'s were also approved:

<u>NO.</u>	<u>Description</u>	<u>Amount</u>
1546-A	Provide for an additional appropriation on cold bend test box	\$ 200
1568-A	Purchase and install 14 Vaughn Fine Wire Drawing Machines	154,000
1510-A	Extra for high pressure pump and motor	977
1556-B	Additional for Edmunds High Speed Planetary tripler	725
1563-A	Additional for two test tanks in Bldg. #20	6,300
1569-A	Additional to cover cost of a spare blower for bar furnaces	323
		\$162,325

PROPERTZ CASTING AND ROLLING EQUIPMENT

This equipment according to C. H. Ellis, is giving us reasonable satisfaction with a running speed of approximately 1450 lbs. per hour although it was anticipated at the time of purchase that we would secure 2000 lbs. per hour. However, we have ordered equipment to convert our unit to the #5 type which should give us 2000 lbs. per hour capacity. This total change will cost about \$2600 including the wheel and changes in the rolling equipment. It is quite possible that we may have to order a larger electric motor for the enlarged production. I believe that as we gain a little more experience in the operation of this equipment we will be able to improve the quality of the product as it comes from the casting and rolling operation.

The Robertson lead press, according to C. H. Ellis, has proven to be mechanically sound but we are having operating difficulties which we find some of our competitors are also experiencing, but we hope will be overcome by technical developments by the Robertson company. The quality of the product from the extruder is excellent.

[fol. 5051]

**ROME CABLE CORPORATION.****TERRANCE PLANT**

In my report to the Board on September 4, 1952 I spoke of the many troubles that had occurred at our Terrance Plant due to delays of furnishing equipment, necessary changes in design and at times lack of steel. In our Annual Report March 31, 1953 I stated, "Evidence is now available that we should begin to get fulfillment of our hopes in production of high quality Rigid Conduit by our new process in the current quarter". I am sorry to have to report that our difficulties encountered in getting the Sendzimer process into satisfactory operation have been varied and many. I will not attempt to go into details. Latest information from conversation that Ross and Charlie had with Art Andersen on August 31, 1953 is indicative of progress and they are both of the opinion that they fully expect by late this week or next week that we will be in production of Rigid Conduit of an entirely satisfactory quality. In fact, Art states that we will have a better quality than any of our competitors and that the cost will, in his judgment, be below the cost estimated by Jay Sarles after his recent trip to Terrance. I appreciate some of these many difficulties and think that Lessers, Andersen and Allis are entitled to our appreciation for the ingenuity that has been displayed in overcoming some of the difficulties.

The Sendzimer process has never before been put in successful operation on pipe. Insofar as we know we are the only licensee of this process for galvanizing pipe. Our sales have been very low for months past and we have been put in a bad light with our customers owing to our past difficulties. I hope that we will soon be producing such quality that our Sales Department will accept the challenge with enthusiasm and get enough business for us to run at a reasonable profit.

**ROME PLANT**

Again may I stress that I believe this is a golden time for us to account efficiency, cost and quality, not only of product but of service. Let us leave no stone unturned to overcome some of the difficulties that seem to be particularly inherent in our present rubber production. It seems apparent to me that we have been trying to do too much copper and aluminum insulated cable business in the limited space available for this enlarged production.

**FUTURE PLANNING**

This seems a very opportune time to press our consideration of what we should be planning to accomplish in the balance of this year and the next fiscal year to overcome some of the difficulties above mentioned by attempting to secure additional space and such equipment as is necessary in order to bring about not only greater efficiency but lowered cost of production. A comprehensive study should also include area market opportunities and a study of the effect of transportation charges to each important sales area on the percentage of profits which might be expected on the various products.

**BUSINESS OUTLOOK**

Since the first of the calendar year we have been steadily cutting into backlog and in no week since then has the volume of incoming orders equalled out-going shipments. We believe the lowest level was reached in mid-August. With the unsettled price situation for raw copper and predicted lower prices

[fol. 5052]

**ROME CABLE CORPORATION**

for that metal it is natural that policies dictating buying only for immediate needs should prevail. The break in insulated wire prices in July and late August produced further hesitancy until it is determined that the market has reached its bottom level. We expect that business in the last four months of the year will be off at least 10 to 15 per cent from the first half levels.

**WIRE PRICES**

Early in July base prices on bare, weatherproof and magnet wire were reduced from 32.10 cents to 30 cents copper base to recognize the change in availability of copper at the 30 cent level. In the same month prices on most standard sheet price items in insulated products were reduced approximately 7 to 8 per cent, with 2 to 3 per cent representing actual copper price reductions. Some of these price reductions ran as high as 15 per cent.

On Monday, August 31, we met further industry reductions of 7-1/2 per cent on most building wire items and 10 per cent on non-metallic sheathed. We believe this is the outgrowth of certain vicious practices, such as extra discounts, price protection, etc. offered to get a larger proportion of the reduced amount of going business.

**ALUMINUM**

It will be noted our aluminum sales for April-August 1953 as compared with a like period last year show a gain of 78.6 per cent. I would expect that with the present price differential between copper and aluminum that this business should continue a steady growth.

We had a visit from Ralph Davies, Vice President in Charge of Sales for the Aluminum Company, and it was indicated that we would probably continue to manufacture their insulated products at least until the end of March 1955. He indicated that their business for the balance of the year on insulated products would be off about 40 per cent from their original expectations. From their studies they continue to be optimistic for the future on a long term basis on a continued upward use of insulated aluminum products. I believe we should do everything possible in our own equipment layout to bring our costs in line on the production of aluminum insulated products.

**INVENTORY**

Greater availability of material, unsettled price structure and vicious unrealistic pricing practices of competitors generated the usual demand for increased consigned stocks during the last quarter. As a result of a careful investigation by the Sales Department we accepted their recommendation in the amount of 2,200,000 lbs. of copper in order to maintain our distribution. It is quite obvious in this transition period from a controlled order economy to stock item shipments that our inventories will have to be increased.

**SPIRAL FOUR**

On April 23, 1953 we filed with the Army Emergency Facilities Board a claim for right to use True Depreciation in our Spiral Four contract, a claim totalling \$620,531.16. We have had a visit from three officials from the Pentagon designated

[fol. 5053]

**ROME CABLE CORPORATION**

to act as a Board of Inquiry into all claims on Signal Corps facilities and are hopeful to get their decision in the near future. No action as yet has been taken on Renegotiation and our total voluntary refunds and price reductions to date on Spiral Four, under our redetermination clauses, total \$4,179,667.30. We still have at issue the matter involved in the claim mentioned earlier, the handling of accelerated amortization.

Our most recent checks with the Signal Corps on Spiral Four indicate that they have funds available in the new budget to cover operations for at least nine months additional or until December 1954. There is some possibility that they may eliminate some of the less efficient contractors. In such case we have been advised that we would have further extension into 1955 but it is doubtful if any increased level of operations can be expected.

**LABOR RELATIONS**

Our contract with I.A.M. Local No. 1875 representing maintenance workers at Rome Plant required reopening negotiations on April 3, 1953. Due to economic conditions at that time an agreement was mutually decided upon to start our negotiations about August 1st. However, the company offered a wage adjustment which was accepted July 13, 1953 including a five per cent increase to the base rate schedule in lieu of the former 4.46 per cent cost-of-living increases. In addition a 6-cent per hour general increase was accepted. The negotiations eliminated a further reopening clause effective December 3, 1953 so that the present supplemental wage contract remains in force until August 3, 1954. Labor relations continue in a satisfactory, friendly condition.

I am advised that absenteeism in our regular factory, not including Spiral Four, for the year ending June 1952 averaged 2.8 per cent, which figure was continued to the end of June 1953. The regular factory portion of absenteeism due to sickness was reduced approximately 10 per cent last year as compared to the prior year.

**MEDICAL DEPARTMENT**

Certain minor changes in our Medical Department enabled us to provide for cardiographic equipment, eye examination and hearing tests by audiometer.

**CAFETERIA**

The quality and variety of food furnished by the Slater System in our Cafeteria has been improved during the past year.

**COPPER RECLAIMING SYSTEM**

With a total capital outlay of approximately \$7,000 we hope to save \$40,000 per year on reclamation of copper scale in the new settling system and a saving of about \$4,000 per annum in the cost of water.

**MOVIE FILM**

We had the first showing of our movie film a few days ago and our Sales and Engineering Departments expressed their approval of this film as a good vehicle to use with customers and utility engineers. Might I suggest that we give some thought to obtaining a shorter film, perhaps fifteen or twenty

[fol. 5054]

RIGID CABLE CORPORATION.

minutes duration, to be used for public relations, such as share owners meetings, etc., etc., which would not go into some of the detail shown in our present film but would give a better impression of the type personnel in our plant and the size and scope of our plant and products.

RIGID CABLE FOUNDATION

We have invested \$70,561.90 in securities under the advice of Carl M. Loeb, Rhoades & Co. They were very generous and cooperative in advising there would be no charge for this service on account of the fact that Rigid Cable Foundation is a charitable organization.

BONUS

I suggest that the list of individuals who share in the bonus be discussed and approved at this meeting and that action on partial payment of the bonus should be left to the judgment of the Finance Committee.

EXECUTIVE BONUS GROUP PLAN

In my report to the Directors on June 17, 1953 I suggested that the Executive Group Bonus Plan be studied with the idea of making certain changes in same and that the Committee making such study should report at this Board meeting. The study is still continuing, but I feel under present conditions that it is wise not to undertake any revision at this present time and that probably we will take no action during this current fiscal year.

EXCESS PROFITS TAX

Excess Profits Tax expires under present laws, at the assurance of our legislative leaders, on December 31, 1953 so that we will have the benefit of our last quarter without the penalty of this tax. I believe that this tax in the second quarter of our present fiscal year will cost about 45 cents per share. It has been a very heavy drain on us.

LONG TERM DEBT

Our long term debt now stands at \$2,104,000 at September 1, 1953. With the enlarged investment due to consigned stocks and the carrying of more ample stocks in our own warehouses it is quite evident that we may be called upon to do some short term borrowing in the not distant future.

SALES MEETING

Our Sales Meeting will be held on September 16, 17 and 18. I think it comes at a particularly fortunate time in order that we may bring our Sales Department up to date with our thinking and stimulate them to obtain a larger share of the going business wherever possible. I feel that with positive assurance of satisfactory quality of Rigid Conduit and the consigned stocks of E.I.T. that we have already given we should be able to secure sufficient conduit and E.I.T. business to put our Terrance plant on a good profitable basis. That is one of our most important immediate jobs in my opinion.



[fol. 5055]

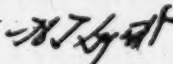
ROME CABLE CORPORATION.

DIVIDEND ACTION

I suggest dividend action be taken at this meeting on our Common Stock, payment to be made to stock of record at September 10, 1953, payable October 1, 1953 at the rate of 35 cents per share of Common Stock outstanding.

Appropriate action should also be taken at this time on employees dividend in accordance with the Employee Dividend Saving Plan.

Respectfully submitted,



H. J. DYER  
Chairman of the Board

[fol. 5056] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 85

Rome Cable Corporation

1953 Sales Conference

Our Future in Aluminum—G. E. Rolston

Under this subject Mr. Rolston indicated that within the last year some of the companies that intended to use aluminum for different applications had found that it was not feasible from a cost standpoint. This was especially true in the Magnet Wire field and we have experienced a slow-down in demand for this particular product.

However, the use of aluminum as a conductor for overhead use has increased tremendously and by comparison he stated that in 1946 twenty-two million pounds of aluminum was sold for this use as compared to 1952 when some 192 million pounds was sold for overhead use. This growth is exceptional and, while some of it was due to copper shortages, most of it was due to a changing trend of the utilities of the country. ACSR for overhead use has been well accepted and the demand for this product will continue to grow. The demand for aluminum Triplex has increased very sizeably and in view of this we have installed a new high-speed tripler and also a new cold feed CV machine. On this subject Mr. Rolston said there were still too many different types of this particular cable being offered and he asked that we all talk about Rome Cable's standard product and steer our customers toward it. The fewer different constructions we have, the better off we are.

We have announced our activity into the bare aluminum field and, as previously outlined, have necessarily restricted this product to States where the freight is now prohibitive. We are prepared to offer for sale all the distribution sizes in ACSR which includes #4/0 and smaller and all sizes up to 1,033,500 CM-61 strand all aluminum. This should give us a fairly rounded line of bare aluminum and ACSR to offer to our customers. At present, we are limited to .062" as the smallest solid wire that we can draw which means #6-7 strand is the smallest stranded size. We are not in a position to offer aluminum conductor in EC-H26

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temper as yet. We will, however, consider selling in any part of the United States if the balance of the job is attractive to us. This will have to be decided by Rome.

Mr. Rolston spoke of the activity in aluminum conductor as far as Building Wire and Cable applies and indicated that the activity in this particular line of products has been limited. Aluminum was first introduced as an electrical conductor for insulated products in 1947 as a Building Wire, but due to lack of connectors and the lack of know-how in handling, it was an unsuccessful adventure. Some manufacturers were burdened with stocks that they could not sell and its popularity was at a minimum. While there has been some activity in the aluminum Building Wire field the demand must be a good deal greater than it is for us to announce this product as one of our line.

[fol. 5057] Aluminum conductor used in Type USE Cable is becoming more popular and may be with us sooner than we think. A few competitors have published price sheets on this product and it will bear watching and he asked for all and any information regarding increased interest from the field.

We are interested in attractive inquiries for any insulated products employing aluminum conductors and these inquiries should be referred to Rome for consideration.

Mr. Rolston recounted briefly the pricing history of Wire and Cables with aluminum conductor and stated that it was more stable today than it has ever been. We have price sheets in our customers' hands on bare aluminum and ASCR, RoLene and RoPrene Weatherproof and also Triplex Cables and he said that when we use these price sheets we should use them correctly and maintain the terms and conditions and discounts as outlined thereon.

With regard to price, Mr. Rolston said that competitive reports show that there is very little consistency in pricing of high voltage cable with aluminum conductor. Our policy is still that we price this material on the basis of substituting aluminum for copper and we think this method of pricing is correct and realistic. However, some of our competitors apparently do not agree with this and we should be prepared for severe and unrealistic competition when dealing with this particular product.

## Competition

This subject was discussed in an informal session with a panel consisting of the following District Managers, the text of their remarks is as follows:

**Mr. A. K. Buckenmaier—Detroit**

Mr. Buckenmaier said that the last few months have been hectic and there have been extra 5 percents and the usual price concessions floating around in his territory. During these times it is especially important to be close to the customer and talk quality and Rome Cable as a company rather than price. It is important that you sell yourself, your company and your product; and it is the only way to overcome price concessions offered by fringe companies.

[fol. 5058] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 86

E. Mark Wolf

Aluminum (Bare) and Magnet Wire Developments  
Bare Aluminum and A.C.S.R. Conductors

You will receive within a few days a new Product Bulletin covering our new line of bare aluminum and A.C.S.R. conductors. This bulletin covers the size range and constructions which we are prepared to supply at the present time:

1. Solid Hard Drawn Aluminum, #14—2 AWG
2. Stranded Class A Hard Drawn Aluminum, #6 AWG  
—1,000 MCM
3. A.C.S.R., #6—4/0 AWG

All aluminum wires used in these constructions are Grade EC-19, produced by our Properzi continuous casting unit.

All three types are manufactured in accordance with appropriate A.S.T.M. specifications as shown in the bulletin.

In the case of stranded all-aluminum, we have listed Class A strandings only, and have shown those CM sizes which



we believe will be most popular. In most sizes we can also supply Class AA and Class B stranding if necessary, and also we can manufacture certain intermediate CM sizes if required.

In the case of A.C.S.R., our steel core wires are made with standard A.S.T.M. weight galvanizing. The two heavier weights of coating covered by A.S.T.M. specifications can be supplied upon request.

The range of sizes we are presently offering in ACSR does not cover the sizes generally used for long cross-country transmission lines. They are mostly the sizes used for distribution.

### Magnet Wire

#### 1. 3/4 Lap Single Paper

This class of magnet wire has grown in use to the point where it is a major part of our magnet wire production. It is replacing both 2-paper single cotton, and 4-paper constructions. We are currently studying our equipment in the light of this trend, and hope to develop modifications which will improve both quality and efficiency.

In this class of magnet wire there has been some confusion as to the meaning of the Price Sheet statement that 1% shall be added to the price for Bonded Paper. Bonded Paper Magnet Wire is a separate class of paper magnet wire which we do not manufacture. We do, in most cases, use an adhesive to keep the paper from slipping on the conductor, but this is not Bonded Paper.

[fol. 5059] 2. Within a few months you will probably receive an announcement from us relative to manufacturer's identification of our product. We have been working with one of our customers for about two years in an effort to develop a means for identifying our product as material made by Rome Cable. We now have on order equipment for indenting the copper with the letters "RC" at six inch intervals. We believe this is a feature which all of our customers will appreciate, and, therefore, plan to so identify all covered rectangular shapes and all covered square wire larger than #8 AWG. You will receive a notice to this effect when we are ready to go.



### 3. Glass Magnet Wire—Small Sizes

In response to many requests from you over the past several years, we notified you on May 7, 1953 that we were prepared to supply Round Glass Magnet Wire in sizes down to #22 AWG, thus extending our previous limitation of #14 AWG as the smallest size we could supply. This required a great deal of work by Plant Engineering, Laboratory, and Production, and also required building and installation of new equipment. We have yet to receive our first order for magnet wire to utilize this new equipment, and it is standing idle. We believe you should try a little harder to get us orders in this size range.

### 4. Silicone Glass Magnet Wire

This class of magnet wire was first introduced by us in 1950. It is rated as a Class H material, suitable for use subject to "hottest spot" temperature rating of 180°C. This compares to 130°C for standard glass magnet wire, which is a Class B material.

The use of Class H equipment is growing slowly. There are many problems faced by equipment manufacturers in construction of Class H equipment, and suitable magnet wire is only one of them. Our Silicone Glass Magnet Wire is a product we can all be very proud of. Based on my own personal observation, I believe it is the best on the market. By use of the best varnishes available, applied carefully, and with proper control of the ~~bake~~ bake, we are supplying a product not yet equalled by our competition. We have one or two large users who will buy this class of magnet wire only from Rome Cable.

### 5. Aluminum Magnet Wire

Engineering studies by several transformer manufacturers a few years ago indicated that the use of glass covered aluminum magnet wire should make possible savings in the manufacture of dry type transformers. One of our customers went into the manufacture of dry type transformers using rectangular aluminum with glass covering, on a large scale. One or two others are either studying the application or trying it on a small scale. At the present

time, these manufacturers have found that additional fabricating costs in their plants may equal or exceed the anticipated savings. This is largely due to the techniques now necessary for making electrical connections and the need [fol. 5060] for more mechanical support of the coils. The manufacturer who was in large scale production has, for the present, abandoned this production in order to study the matter further. We do not know whether or not this product will find a permanent place in the electrical field. In the meantime, you should remember that we have made more of this material than any other supplier, and are ready to produce it if required. We have accumulated a fine background of experience with this product which is available to your customers.

#### 6. New Materials

There are many new covering materials for magnet wire being offered and discussed. Most of them are for Class B or Class H applications, are supplied in tape form, and are quite expensive. Such materials as Mylar, and Quintena-Mylar are being strongly promoted by some manufacturers. We are familiar with these materials and in many cases have made samples of magnet wire for test. In the case of Quintena-Mylar, we have supplied small quantities to one customer. In discussing these materials with our major magnet wire customers, we have not found any promising applications as yet. Please keep in mind that we are trying to keep up to date on these matters. If you learn of interest in these materials keep us posted and if you need information on them, let us know.

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[Vol. 5061]. IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 88

ROME CABLE  
CORPORATION

ROME, N.Y.

IN WITNESS  
WHEREOF THE BOARDREPORT SUBMITTED TO THE BOARD OF DIRECTORS  
OF ROME CABLE CORPORATION AT THEIR MEETING  
MARCH 3, 1954

I present herewith net sales and earnings by fiscal years up to March 31, 1953,  
and by quarters for the current year and the month of January:

<u>Fiscal Year Ended</u>	<u>Net Sales</u>	<u>Earnings</u>
March 31, 1937	\$ 1,798,092	\$ 1,616
March 31, 1938	4,957,103	71,027
March 31, 1939	5,370,665	245,036
March 31, 1940	6,080,902	297,736
March 31, 1941	9,465,451	431,501
March 31, 1942	11,631,785	592,135
March 31, 1943	12,712,333	367,654
March 31, 1944	16,909,735	466,709
March 31, 1945	22,798,218	486,653
March 31, 1946	16,975,009	398,973
March 31, 1947	18,436,305	1,359,593
March 31, 1948	25,202,853	1,152,579
March 31, 1949	26,088,523	1,115,940
March 31, 1950	19,602,984	302,209 )
	Add: Portion of	)
	metal profits	)
	set aside in	)
	prior years to	)
	offset copper	)
	loss	150,000 )
		452,209 )
March 31, 1951	35,142,901 Net	\$1,922,136
	Transferred	
	to earnings	
	retained	150,000 1,772,136
March 31, 1952	42,657,848	1,753,651
March 31, 1953	54,632,976	2,008,321
April - June Quarter	13,858,372	524,190
July - September Quarter	10,732,248	409,129
October - December Quarter	10,262,761	325,676
Total Nine Months	34,853,381	1,258,995
January 1954	3,159,076	80,567

[fol. 5062]

**ROME CABLE CORPORATION****EARNINGS**

While our earnings for the third quarter dropped \$84,000 below the prior quarter we must recall that the July-September quarter was improved by \$120,000 due to reduction of tax rate to 65.5%. Sizeable price declines in building wire items adversely affected any comparisons for the prior periods.

Despite the increased sales in January net earnings for that month just equalled December due to further price declines and the fact that in December we included a sizeable inventory pick-up in Spiral 4. Therefore earnings will show a drop in the current quarter due to reduced volume and poorer prices. Our earnings for the year should approximate \$3.00 per share compared to \$4.01 in the prior year and \$3.58 in the year ended March 31, 1952.

Looking ahead for the first six months of the new year, while we will run out of the Spiral 4 program in the first quarter, we should see considerable improvement in the Torrance picture and our tax percentage will drop to 52% compared to 65% in the current year. If we assume continuation of the present volume, we will not produce as satisfactory earnings for the first six months of our next fiscal year as in the same period of 1954.

**SALES**

While January showed about a 10% increase in sales above the low of December it was expected that the total for the quarter will run about 10% behind the October-December period, with a total for the year approximating \$44,000,000 or 20% behind the previous year. More than half the decrease is accounted for in difference in Spiral 4 sales in the two years. Lower prices for insulated products account for several hundred thousand dollars more.

The breakdown of sales for the past ten months compared with a like period in the previous fiscal year shows the following:

	April 1953 Jan. 1954	April 1952 Jan. 1953	% Increase or Decrease
Rods	\$ 4,273,337	\$ 5,637,747	(24.3)
Bare	5,355,194	5,027,825	6.3
Weatherproof	2,248,070	2,765,402	(18.8)
Magnet	2,656,949	2,855,951	(7.0)
Rubber Covered	15,216,317	17,390,208	(12.6)
Torrance -E. M. T. (incl. T. V. Mast)	2,213,848	1,793,250 (EMT)	23.5
" -Rigid	453,499	805,895	(43.8)
Spiral 4	5,293,894	10,699,954	(50.6)
Aluminium	1,993,541	1,327,892	50.1
Total -Rome	37,037,302	45,704,979	(19.0)
" -Torrance	2,667,347	2,599,145	2.6
GRAND TOTAL -	\$ 39,704,649	\$ 48,304,124	(17.8)

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[Vol. 5063]

**ROME CABLE CORPORATION****BACKLOGS**

Our backlog continued to decline throughout the entire year 1953 and continued so into January of 1954. This condition has been reversed in February and we are pleased to report that on wire and cable and aluminum items incoming orders to date have exceeded shipments for the first time in seventeen months.

Backlog figures of a year ago, August 31st and the latest figure for the current year are shown below:

	<u>Quantity</u>	<u>Value</u>
February 21, 1954 - Wire & Cable	4,026,000 #	\$ 2,406,000
Aluminum	578,000	312,000
Spiral 4	197,000 pcs.	1,100,000
Torrance	1,090,000 ft.	127,001
August 31, 1953 - Wire & Cable	7,417,000 #	4,705,000
Aluminum	466,000	388,000
Spiral 4	678,000 pcs.	3,782,000
Torrance	3,339,000 ft.	381,420
February 21, 1953 - Wire & Cable	11,592,000 #	8,585,000
Aluminum	1,148,000	920,000
Spiral 4	1,298,000 pcs.	8,112,000
Torrance	1,695,000 ft.	275,439

**COPPER**

Despite our feelings to the contrary the price of copper has continued at around the 30 cent level. Informed opinion seems to feel that it will stay around that level until late March, owing to the fact that the Chilean Senate failed to ratify contract for sale of approximately 100,000 tons to the United States stockpile and tax agreement with the United States companies on new production. We continue to feel that the price of 30 cents is too high and reduction to around 25 cents should stimulate business.

**OTHER MATERIALS**

We are overstocked with steel for Rigid at Torrance owing to production not living up to earlier schedules because of difficulties of the hot dip furnace. It will take several months to bring this into balance. Steel is now available on near-term shipment. This condition also prevails with all of our other materials.

**INVENTORY**

We are bending every effort towards bringing our copper inventory into balance of approximately 11,100,000 pounds, which is our LIFO base.

Physical inventory was taken at the Rome plant at the end of January and preliminary reports indicate satisfactory results.



[fol. 5064]

**ROME CABLE CORPORATION.****LABOR**

Figures covering factory payroll are shown for representative weeks in the last year as well as total number of salaried employees for the same period.

	<u>Week Ending</u>	<u>Employees</u>	<u>Total Payroll</u>	<u>Avg. Wkly. Wage</u>	<u>Avg. Hrs. Worked</u>	<u>Number Salaried Emp</u>
<u>ROME</u>	2/21/54	M 958	\$ 70,879	\$ 73.99	38.4	418
		F 69	3,912	56.70	35.6	
		1027	\$ 74,791	\$ 72.83	38.2	
	8/23/53	M 1017	\$ 83,003	\$ 81.62	41.1	411
		F 93	5,560	59.79	37.0	
		1110	\$ 88,563	\$ 79.79	40.8	
2/22/53	M 995	\$ 90,718	\$ 91.17	45.4	397	
	F 119	6,950	58.41	37.4		
	1114	\$ 97,668	\$ 87.67	44.5		
<u>TORRANCE</u>	2/13/54	149	\$ 12,216	\$ 81.99	38.3	30
		148	\$ 12,328	\$ 84.65	38.3	34
	2/14/53	141	\$ 11,073	\$ 78.53	38.5	28

You will note from the above the drop in average hours worked at Rome of over 6 hours per week from a year ago and a drop of about \$14, as well as a decline of almost 100 in number of employees at Rome. Our number of salaried employees, however, has increased from 397 to 418 and we believe that this is a subject for very careful review in the light of current conditions.

**CAPITAL EXPENDITURES**

E. R. 's approved since the last meeting of the Board of Directors:

<u>E. R. No.</u>	<u>Description</u>	<u>Amount</u>
<b><u>ROME</u></b>		
1601	Provide appropriation for Furniture & Fixtures for Rome Plant, second half F. Y. 1953	\$ 5,000
1599	Purchase a parcel of three lots on the southerly side of Henry St. and also a parcel of three lots on South Jay St.	33,000

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[fol. 5065]

**ROME CABLE CORPORATION****CAPITAL EXPENDITURES -Cont'd**

<u>E. R. No.</u>	<u>Description</u>	<u>Amount</u>
1600	Purchase a parcel of four lots on westerly side of South Jay Street	\$ 17,000
1603	Purchase and install laboratory abrasion tester	800
1604	Purchase and install two micro welders for use at the payoffs of the continuous vulcanisers	1,000
1605	Construct and install mechanism for revolving pans of cable back of lead extruding machine	1,500
1606	Construct and install a takeup for tubed rubber fillers	2,500
1607	Purchase and install double extended tuber and drive to replace similar equipment on C. V. Mach.	10,000
1608	Make improvements and additions to Cabling Machine and install in Bldg. No. 20	9,000
1609	Purchase one modulus test machine and one cavity test specimen mould	1,100
1610	Purchase one thermocouple potentiometer	200
1611	Purchase one double portable bridge	300
1612	Construct and equip enclosure for handling of fine chemicals in Compounding Dept., etc.	5,000
1613	Purchase and install three micro limit control gauges on tubing machines	7,500
		<u>\$93,900</u>

**TORRANCE**

C-211	Construct a Maintenance Shed	985
C-212	Purchase and install Thermo-Couple actuated temperature controller in flame heater portion of the Hot Dip	1,000
C-213	Construct stairs, railings and catwalks in degreasing and enameling pits on lacquer dip	1,180.94
C-214	Purchase and install fluorescent lighting fixtures over lacquer dip inspection table	425.86

[fol. 5066]

ROME CABLE CORPORATIONCAPITAL EXPENDITURES - Cont'd.TORRANCE Cont'd

<u>E. R. No.</u>	<u>Description</u>	<u>Amount</u>	
C-215	Purchase Sheet Metal Safety Guards	\$ 1,149.65	
C-216	Enclose sides and top of lacquer dip conveyor assembly	817.23	
C-217	Purchase and install fence	256.00	
C-218	Purchase one Vinco Model B-1 Angle Tangent to Radius Grinding Wheel Dresser, etc.	755.00	
C-219	Purchase one "Skil" Radial Saw	675.00	
C-220	Purchase material and install additional power service to Bldg. No. 2	4,400.00	
C-221	Construct one End Reaming Machine	6,100.00	
C-222	Construct a "Wire-Pulling" Machine	560.00	
C-223	Purchase one used "Bliss" Punch Press with motor	772.50	
C-224	Purchase one "Beeler" Superheater and Flow Meter	9,000.00	\$28,067.18

Additional E. R. 's approved:

ROME

1548-A	Additional for reclaiming copper from Red Mill descaling and cooling water	\$ 55,000.00	\$55,000.00
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TORRANCE

C-166-A	To complete installation of speed control	535.00	
C-207-A	Complete installation of emergency showers	582.74	
C-211-A	Electrical wiring and cabinet work to complete the Maintenance Garage	500.00	
C-197-A	Complete one broaching machine for removing kash from all sizes of Rigid Conduit	4,750.00	\$ 6,367.74

[fol. 5067]

**ROME CABLE CORPORATION**

For the current fiscal year our capital expenditures will approximate \$650,000, while total depreciation of \$540,000 and accelerated amortization of \$161,000 should total \$701,000. As of March 31, 1954 we will carry over in approved expenditures approximately \$135,000 to be paid for in the first quarter of the new fiscal year.

Our problem today is to review carefully the requests of both plants and discuss a program for the new fiscal year. Our factory managements at both Rome and Torrance have answered our request for potential requirements, and they have indicated a need for approximately \$567,000 at Rome and \$65,000 at Torrance. This is within the yearly depreciation and accelerated amortization accrual. However, there is much that should be discussed on expenditures that would improve layout, reduce costs and provide some additional capacity where needed for the future.

With the expiration of the Spiral 4 contract in May best utilization of that building can only be had by closing Henry Street and joining the Spiral 4 building to our present insulating building. We have had under considerable investigation a new scrap disposal proposition and have carried on some investigation of potential volume in telephone wire. I believe we should hear from our three Vice Presidents, Messrs. Ellis, Schatzel and Rolston as to the urgency of some of the matters suggested for executive consideration in the factory management requests for capital expenditures. In any program of going beyond our depreciation charges consideration must be given to providing new money for this purpose. The Mills plan requiring payment of 90% of our tax bill in the first six months of our new fiscal year creates a heavy drain upon our cash and could well mean short-term borrowing. I would like to have a full discussion of this subject, particularly regarding the form or means of raising the money as well as the wisdom of embarking on such a program at this time.

I believe it is imperative that we proceed with a request to the City Administration to close Henry Street. Preliminary conversations with Mr. Hinman of Rome Strip Steel have not been entirely satisfactory and he may not be very cooperative.

I feel that at the present time, we should stop, look and listen before committing ourselves to the larger expenditures indicated in C. H. Ellis' first report headed - "For Special Executive Decision." I believe that between now and our next regular quarterly meeting, we should have more knowledge on several very important matters, including the answers to such questions as:-

- (1) Will ALCOA continue on a satisfactory basis with us?
- (2) Will the City approve closing Henry Street?
- (3) Will price of copper be stabilized?
- (4) Has the situation by then sufficiently clarified so that we may know whether we are facing a larger recession than I now anticipate?
- (5) Is our Torrance operation on a satisfactory basis?

[fol. 5068]

**ROME CABLE CORPORATION****CAPITAL EXPENDITURES -Cont'd**

I believe that we can judge the balance of 1954 fairly accurately within the period between now and our next quarterly meeting. Until the above matters are clarified, I would hesitate, in fact, I would not be in favor of the larger program mentioned in Mr. Ellis' report. After these matters clear up, and I have further knowledge re financing and more information on certain parts of the expenditures, I shall then be prepared to vote such amounts as seem proper under the circumstances.

**LONG TERM LOAN**

With our payment of \$206,000 on our long-term loan, on January 1st, the debt was reduced to \$1,899,000. Because of the indicated very heavy drain on cash in the new fiscal year and possible needs arising out of potential capital expenditures, Mr. Fraser, explored with J. P. Morgan and Co. the possibility of increasing the loan by \$1,000,000. They in turn checked with Connecticut Mutual and had a prompt response that they would be very glad to arrange for such an increase.

**PRICES**

The highly competitive price situation reported in my last letter shows further deterioration. Two additional price cuts on building wire items since our last meeting now bring the accumulative total to approximately 40% on many items since last July 1st. Most items of building wire are now being sold below cost, with reports reaching us that additional discounts are being offered as well as other special inducements, such as price protection for extended periods. Price reductions have extended into other fields such as power cable, and we have found it necessary to review manufacturing practices and margins on all sizable inquiries in order to maintain our customer relationship and proportionate volume.

**ALUMINUM**

Our aluminum volume continues to grow satisfactorily. Sales for the first ten months of the current year are 50% better than a year ago. Dollar volume of our own sales in the two periods was up 63% and our toll 28%. In the calendar year 1952 we processed approximately 1,600,000 pounds of aluminum which figure climbed to over 3,500,000 pounds in the calendar year 1953. At the January rate of shipment 1954 could exceed 5,000,000 pounds. Copper contents of insulated products shipped in November, December and January totalled 3,600,000 pounds and aluminum a little over 1,000,000 pounds, or approximately 3,000,000 pounds of copper equivalent. If our shipments of copper insulated products should return to more nearly normal levels and aluminum should continue its growth, it is quite evident that our insulating capacity would soon be taxed to its limit, and this matter should be given consideration at this time in our review of capital expenditures at this meeting.

In the calendar year 1952 we used 824,000 pounds of aluminum for ALCOA and in 1953 this climbed to 2,010,000 pounds. In January the total aluminum content of shipments equalled 278,000 pounds. I believe it is important that we should make an early review with ALCOA as to their current thoughts, and we should be prepared to come up with our best prices and ability to perform to meet their needs since I feel this is desirable business.



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[fol. 5069]

**ROME CABLE CORPORATION**

**ALUMINUM -Cont'd**

We have produced over a million pounds on our Properzi equipment. Production was coming along in quite satisfactory fashion until November when a variety of trouble on both the casting and rolling equipment beset us. Important design changes have been made during this time, and we hope to resume experimental runs this week. During this down period we have been purchasing rods from ALCOA to meet our own requirements.

**TORRANCE**

Many things have happened at Torrance since my last report. First, Art Andersen has resigned as Vice President and General Manager of the Torrance Plant as of December 31, 1953. Mr. Gilbert Woodill was appointed Acting Manager, and I am pleased to report excellent cooperation by the organization at Torrance as well as a good approach to the solution of many of its problems. Steps have been taken that will provide competent administration for the plant in the near future.

On February 1st hot dip galvanizing unit was shut down to make the necessary changes for efficient production. These have been completed, and trial runs are being made at the time of the writing of this report and will be reported verbally at the meeting. Satisfactory arrangements have been made with Pittsburgh Standard Conduit Co., Pittsburgh, Pa. to sell us sizes larger than 2", which gives us a complete line. This is a further incentive for our Sales Department, and with the high quality of our product our sales should climb steadily. Efforts can now be further directed at cost reduction and maintenance of quality. We have added a sales promotional man, Mr. Ufer, formerly head of the Underwriters' Laboratories inspectors in Los Angeles which should help our Sales Department.

Electric Furnace Company paid us \$20,000 to cover work we had done to complete the furnace. We have also had one meeting with Electric Furnace and ARMCO Steel representatives having in mind potential development of the Sendzimer process, including some potential patents that we may have, that should eventually raise the standards for rigid conduit and be beneficial to all three companies.

Facilities are badly needed for warehousing finished material at Torrance, and I hope we can have a preliminary discussion on this subject. However, such a major expenditure should be deferred until our manufacturing problems on rigid are finally solved.

**SPIRAL 4**

Much has happened regarding Spiral 4 since our last meeting. At that time we had expected to be continued in the program at approximately the same rate as the then current production of approximately 4,000 lengths per month. As of now, when we complete the present contract in May our part of the program ends. Briefly the story is this.

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ROME CABLE CORPORATION,

SPIRAL 4 -Cont'd

In late December the Signal Corps asked all six contractors to bid on portions of a total program about equivalent to ours alone. We were awarded half of that program. Before actually receiving the order the schedule was cut in two and new bids asked. Other contractors having had our prices made available to them under-cut us by approximately \$2.50 per length. Despite the fact that we had refunded or reduced prices to the extent of over \$5,000,000, or 20% of our original contract, and had the best record on quality and delivery performance of any of the contractors, according to the Military, we were dropped as a supplier. We are making a vigorous protest to Washington concerning the unethical handling.

Steps are being taken to get disposal of the equipment and integrate the building into our other operations. We are very proud of the job that our organization has done on this important development of a part of our Country's defense requirements. We sorely regret the necessity of breaking up an organization that made so many fine records and whose productive results earned the esteem of all who came in contact with it, except evidently the Procurement Officers of the Signal Corps. If the handling of our Spiral 4 contracts is representative of what is happening on other large programs for our defense it is a frightening thought.

Our President went to Washington on Monday and conferred with General Conrad, head of Procurement for the Signal Corps, on the future of Spiral 4 requirements. He was advised that no further program is contemplated for the current year, so we should proceed with the removal of Government facilities as soon after the contract is completed as is practical.

REDERMINATION

We have finally received modification letters from the Signal Corps on our Spiral 4 contracts agreeing to fixed prices on all of the contracts, which we agreed to accept in lieu of our True Depreciation Claim. Messrs. Sarles and Weiss are to be highly complimented on their excellent and alert handling of this matter.

RENEGOTIATION

Our comptroller, J. T. Sarles, has had a first meeting with the Renegotiation Board in Boston and has been asked to prepare additional data. We plan to pursue this vigorously in an effort to get all renegotiation cleaned up at least through March 31, 1953.

INVESTMENT IN SYNTHETIC RUBBER PLANT

In December we were approached by Simplex Wire & Cable Company to join with several other wire companies and other rubber fabricators to organize a potential company to make a bid on one of the RFC Synthetic Rubber Plants. This is just in the process of being organized. After careful study by the Executive Committee it was decided that protection of the supply of synthetic rubber was important for our future planning and that we should carefully analyze the proposal which could mean an investment of approximately \$100,000 by us.

[fol. 5071]

**ROME CABLE CORPORATION****MOVIE**

Our movie has been completed and has had several showings with very favorable results. This movie is largely for use by our Sales and Engineering Departments. The present movie runs approximately 45 minutes and is too long for general public showing. We have been working with Loucks and Norling and have their proposal on a 20 minute version of more public relations appeal. An outline of the script has been submitted to us and looks favorable, and I recommend that we authorize the production of such a movie at an estimated cost of approximately \$20,000.

**ADVERTISING BUDGET**

The quality of our advertising has steadily improved, and we spent approximately \$200,000 in the current fiscal year. A budget for the new year of approximately \$225,000 will be presented to the meeting for consideration. The major portion of the increase will be spent for product promotion.

**ROME CABLE FOUNDATION**

In our 1951 fiscal year we appropriated \$50,000 to found Rome Cable Foundation and added another \$75,000 in the next fiscal year. Total contributions, including \$7400 for scholarships, will run about \$40,000 through March 31, 1954, leaving us about \$85,000 at the end of the current fiscal year of which approximately \$70,000 is invested. Our program on scholarships will expand still further during the current year. In line with our desire to build the Foundation so that income could carry on a goodly portion of its work I recommend that we discuss amount of appropriation for the current year and that instructions be given to the Finance Committee to act before March 31st.

**CONSULTANTS**

For about two years we have had an arrangement with Dr. Winding of Cornell University to act as Consultant on special research on rubber. This has been highly satisfactory. For about the same time we have had an arrangement with J. C. Ward, Jr., now President of Vitro Corporation, which has also been stimulating and productive. In January we engaged Dr. T. Fuller, retired Chief Metallurgist for General Electric Company, who will give us three to five days per month in the field in which he is so well versed - metallurgy.

**DIVIDENDS**

For several years it has been customary at this meeting to consider declaration of an extra dividend when earnings warranted it. For the entire fiscal year to date we have been on a regular rate of 35 cents per quarter, which if the same rate was declared at this meet/ would make payment of \$1.40 in the current fiscal year. We consider in view of current business conditions it to be unwise to declare any extra at this time but feel that the payment of \$1.40 for the year is modest in relation to the expected earnings and so recommend payment of 35 cents on March 30th to holders of record March 10th. Payment should also be made to the employees under the Employee Dividend Plan at the same time.

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ROME CANE CORPORATION

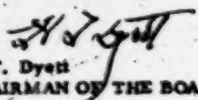
#### EXECUTIVE BONUS

We disbursed \$100,000 of the Executive Bonus for the year in December. I recommend that another \$100,000 be paid after this meeting and depending upon the conditions prevailing and results of February operations and inventory check-up that another \$50,000 be left discretionary with the Finance Committee for payment before March 31st.

#### OUTLOOK

While many of the national indices continue to decline our incoming orders seemed to reach the bottom of the decline in the latter part of December and since that time have been showing an encouraging up-trend. I believe that volume in the first quarter of our new fiscal year should show a 10 to 20% increase above the last quarter of this fiscal year, in physical volume but not dollar value.

Respectfully submitted

  
H. T. Dyett  
CHAIRMAN OF THE BOARD

[fol. 5073] IN UNITED STATES DISTRICT COURT

**PLAINTIFF'S EXHIBIT 90**

To: H. T. Dyett

From: R. A. Schatzel

Date: June 7, 1954

Subject: Engineering—Research and Development

Dear H. T.:

This year has been characterized by a rapid change in supply of materials and in intensified competition to sell those materials, as well as competition in our own field. More critical demands of quality and service have been paralleled by the impact of the introduction of new or improved materials, the result of Research in many fields.

On the whole our company has met the challenge and in some areas assumed a position of leadership. In none have we lost a position of contention.

**Engineering**

Increased recognition of our company among Engineers in the many fields our products enter, such as utilities, industrials and Government, including the Air Force, Navy, and Signal Corps has continued.

Within Industry Technical organizations such as IPCEA, ASTM, ASA, and Underwriters' Laboratories, many new specifications for materials and methods were adopted by Committees representing both Consumer and Producer on which our representatives were in most cases Chairmen, or took a leading part. These are mentioned as evidence of acceptance of our company's position in the Technical Field we are part of.

**Research and Development**

We are continuing a program of development on Synthetic Rubber under Dr. Winding at Cornell. This is a fundamental study and development of broad background for development. In our own laboratory careful screening of new materials and where warranted, intensive investigation has been carried on.



Butyl Rubber insulated cables have become a regular product and extended application is rapidly progressing.

Silastic insulations have been improved and are being recognized in the industry.

Plastics with improved properties have been developed and find their application in oil fields, appliances and industrial uses. Typical of these are new products—FlexAll a plastic underground cable and Building wire as well as Cathodic Protection Cable and Polyethylene Mine Power Cable.

[fol. 5074] A few years ago hot and cold Arctic Rubbers were a somewhat humorous curiosity; during the year considerable cable was made and approvals received on a broad group of Government constructions.

New and improved form of Polyethylene is extending its use in the Power and particularly the communications field. Expanded Polyethylene for Communication Cables challenges old uses of paper.

With the extension of Automation which has been going on for many years, Control Cables are the nerves of such a system. We are established in this field. Our real participation in it depends on our ability to furnish multi-conductor types.

Many new requirements are presented to us, and new tools for their evaluation developed. Radio-active isotopes are becoming an important tool in industry for investigation and control. We have followed this development for some time, and are having personnel trained in the techniques of handling, and familiarity with the use of such materials.

#### Aluminum—

Much could be written on this. Aluminum is established in the insulated electrical conductor field and it is fair to assume its use will grow rapidly, particularly in those applications where space is not a primary factor.

Our development of casting has progressed satisfactorily. Control of metal purity, determination of proper temperatures and their regulation; selection of materials and methods of operation all have been improved. Fur-

ther improvement is required, but at this date we believe two conclusions can be made:

- (a) The Properzi Casting Process is practical.
- (b) A product meeting the requirements of industry can be made.

Improvement in design of equipment, furnace, casting wheel and rolling mill is to be expected and required, for a completely satisfactory production unit.

#### [fol. 5075] Patents

Results of prior development have resulted in patents issued to us and several other applications in prosecution. We have licensed The Standard Machinery Company on a Splice Box for extrusion machines covered by a Rome Cable development.

The Duffy patent on Spark testing of cables has been issued and several companies are interested in licenses.

We are working with Armco and Electric Furnace Co. to obtain coverage of our Torrance process of producing Rigid Conduit.

#### Student Training

While this may not properly be a part of this report, I believe it pertinent. Due to extreme competition for technically trained graduates and the fact that the supply of G.I. students has run out, difficulty in recruiting suitable candidates is increasing. A review of our practice in training will be necessary. It is probable that the supply of technically trained personnel will not improve until after 1960.

#### Quality and Inspection

As previously mentioned, a higher level of quality and service has been demanded by our customer. This is a buyers market. We cannot inspect quality into a product—it must be built there. More stringent inspection has been exercised and increased product evaluation testing has been instituted by our Inspection Dept. With the full cooperation of Production and, at their request, an exten-

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sion of the statistical quality control program, so well worked out in Spiral 4, is being made to our insulating processes. The general level of quality in the industry has been raised. Rome Cable has maintained a high ranking for dependable quality, despite a few instances where the appearance of our products were criticised. These have been corrected.

Very truly yours,

R. Schatzel.

RAS P

[fol. 5076] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 91

7/8/54

HTD:AS

Meeting July 7, 1954

"Whither Goest Thou"—Continued

Present: Val, Glenn, Jay, Charlie, Jack, Harry, Rudy, Ross and myself.

With a few opening remarks by H.T., Charlie was called upon to explain the program which we will consider today. He carefully went over the proposed changes in the department and indicated his hope that we erect a new building of approximately 100,000 sq. ft. at an estimated cost of \$450,000 to be used for shipping and storage. The building will lie east of Bldg. #20 and west of South Jay Street. This will give us excellent trucking facilities and keep our trucks far from congested areas. This would release Bldg. #20 so that the upper floor could be used for an additional manufacturing space for the Rubber Wire Department. This space would permit of approximately a 40 per cent expansion in our rubber manufactured output. The essential equipment that we would plan to order at the present time contains the following large items:

Lead Extruder	\$80,000
One large extruder for either rubber or synthetic	35,000
One Larmuth	40,000

Drawing machine for copper, releasing one of the present copper machines to be used for aluminum .....	40,000
Cabler .....	70,000

It is Charlie's opinion that the total equipment to be ordered would be approximately \$700,000. With this equipment and rearrangement we would be able to increase our capacity by at least 10 per cent, mostly in power cables. He figures an annual saving due to rearrangement of the department, largely accounted for in our traffic, at \$300,000 to which would be added the additional profit due to enlarged operations of \$100,000, or a total before taxes of \$400,000.

[fol. 5077] After considerable discussion by everyone in attendance Rudy finally made the comment, "The program looks good. We must make larger sizes and longer lengths to satisfactorily serve our customers. Control cables are a growing market. The tendency is towards higher voltages, particularly in the use of improved plastics." In the comparatively near future he sees the prospect of greater use of Butyl. He definitely believes that Butyl will eventually supersede oil base cables. All manufacturers at present are having trouble with Neoprene. The percentage of plastics compared to rubber insulation is constantly growing.

Charlie brought up the question of a large closer and a six wire bay for 16 inch reels—approximate cost \$70,000. Rudy: The above would be desirable on communication cables.

Rudy: Magnet Wire—The use of Magnet Wire in electronics, flat, square and down to #30 will continue to grow. He stated that he believes we could make and offer a plastic insulated Magnet Wire with a two mil insulation which would equal enamel and double cotton.

Charlie: Should we attempt to go to one million C.M. C.V. cure? He stated that General Electric are extruding wire vertically which overcomes certain difficulties on the larger sizes. It was thought that we should attempt to go to 500,000 C.M. if possible.

Ross and Glenn discussed P.D's shipping bare wire on 1,000 lb. reels. If we determine to do this we would have

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to purchase from 200 to 400 reels. Glenn says there is a strong customer demand for larger packages.

Ross spoke of the pricing situation on ACSR and asked the question whether we should consider ACSR in connection with our Properzi equipment. Glenn thought that we might be able to dispose of 250,000 lbs. of aluminum wire per month. Ross said we should like to be able to offer ACSR. Glenn: Yes, on a limited basis and up to 500 C.M. it would help our sales picture as we could then offer ACSR with insulated aluminum cables in car lots. This he believed would enable us to eventually work up to [fol. 5078] 250,000 lbs. per month of aluminum wire to be used in our own aluminum sales.

Glenn discussed control cables which are a big factor in industrial plants today. The plants are buying through jobbers. They are not conscious of quality. The trend at present is towards plastic. The prices are below the prices we are offering. We should strive to manufacture Butyl on C.V. equipment at least up to 4/0, or possibly up to 500 C.M. All our competition is C.V. insulated. We are "behind the game." The trend towards Polyethylene is very fast. We have experienced so much of delays, reruns and repromises that our boys in the field have taken a hell of a beating and their morale is very low.

Ross raised the question, is aluminum building wire out? Glenn: Do not expect it will grow unless the splicing difficulty is solved. Rudy: Says he believes sizes #1 and larger are okay because they would be installed by expert electrical contractors; but the smaller sizes where the plant electricians would handle them would cause trouble and all thought we should not offer them for sale.

Rudy said he believed our building and equipment plans should be approved. Harry stated he thought the cost of our plan was justified if we can improve efficiency and cut costs. Glenn made the statement that 62 per cent of our sales last year were in New York and contiguous states. Jay thought for a short time perhaps we could defer building. Charlie explained why he did not agree with this and felt the building was essential.

H. T. asked the question, are any new products in the minds of any of you? Jay: How about assemblies? Char-



lie: From our past experience I think it is out of our line.

Jack: How about plastic pipe? Rudy: At present no standardization. ASTM are studying the matter. Believe we

should keep our eye on it, but not favorable at present.

Glenn: Thought we should look into armored cable up to 3 inch diamenter. Equipment is made by Sleeper-Hartley.

He suggests we get cost on equipment. This was discussed [fol. 5079] at some length and it was agreed that this was

worth looking into. Ross: How about some of our products on which we have lost ground? What can we do to

build back? Charlie: Spoke of instrument wire and thinks we can get costs down to make us competitive. Glenn: We

are about 7 per cent high on instrument wire. Unless we get costs down we will lose business. Last year amounted

to about \$700,000. Charlie: Think we can bring our costs down. It was decided Charlie and Jay should study costs

and labor rates. Glenn: Airport Lighting Cable. Our speed of insulation is from  $\frac{1}{2}$  to  $\frac{2}{3}$  the speed of our competitors which makes our cables high priced. He thought

we should check very carefully on what we could do on 5,000 volt airport lighting cable. Jay to estimate costs.

Rudy: Think we should take order for experience. Large orders are being placed. Glenn: Brought up Navy cordage.

We are losing out because of prices. H.T. Fundamentally he thinks it bad business to lose our position with

good customers like Boston Edison and people of that type. As a general thing it has been his experience that when

a plant runs fairly full it makes money even if it has to take some business at exceeding low prices. At a time like

this he felt it wise to meet the situation and keep in the customers' good graces and work towards bringing our

costs down. He thought it was very important not to slip on any of our good products. Ross: We are meeting competition as far as possible.

Ross gave a little discussion on the loan that we are in the process of making, stating that the cost of the plant

changes were estimated at \$1,100,000. Our depreciation is now running \$700,000 which would provide all but \$400,000

or \$500,000 over the depreciation for the proposed building and rearrangement. Our finances are satisfactory. He

thinks that the rearrangement of the plant is very vital.

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Upon each person being called on to vote approval or disapproval the vote was as follows:

Rudy	Yes
Jack	Yes
Charlie	Yes
Ross	Yes
Harry	Yes
Glenn	Yes
Val	Yes
H.T.	Yes

[fol. 5080] H.T. then discussed the fact that "merger" seemed to be in the air and a good many companies were merging or considering it because they desired to get greater diversification. He suggested that we give some thought to this matter at this meeting in a purely informal way and state if we so desired both the advantages and the disadvantages. He thought we should consider it very largely from the stockholders angle, as we were the trustees for the stockholders and we should carefully study in our own minds what effect future action might have on their stock.

Ross: He is aware of the difficulties of even one extra plant. We have learned that at Torrance. He thinks that it would be much easier to operate as we are rather than to go into a merged company with one or two other organizations. Glenn: Thought we could build up some of our present lines more than we have. He brought up the question of the flat business he hoped we can develop with the Rome-Turney Company. He thinks we can expand our own business along our present lines. By good hard sales and engineering we can aid our position with a number of our customers.

Ross asked, how about aluminum? Glenn: Said he did not think we could build our ACSR sales very large from Rome plant. He thought Chattanooga was a much more favorable location. Rudy gave his ideas very clearly on the idea of merging with anyone by the statement he had never seen a merger "without a lot of indigestion." Val said, let's stay as is. Jack: Think we all do not care for merger. We might, if the opportunity offered, take over a small plant some time which would not upset our own

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organization. Charlie: Think we will find plenty of opportunity in our own business. Harry thinks we should listen but go very slowly.

[fol. 5081] It was very evident that the feeling was quite unanimous that we have plenty of opportunities in our present business and that it seemed undesirable to give any thought to merging our business by joining other companies.

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[fol. 5082] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 92

# **ROME CABLE CORPORATION**

ROME, N.Y.

EXHIBIT  
CONTAINED IN THE RECORD

REPORT SUBMITTED TO THE BOARD OF DIRECTORS  
OF ROME CABLE CORPORATION AT THEIR MEETING  
SEPTEMBER 8, 1954

The figures on net sales and earnings for all prior years ending March 31, 1954, as well as the April-June quarter, the month of July and estimated figures for August are given below:

<u>Fiscal Year Ended</u>	<u>Net Sales</u>	<u>Earnings</u>
March 31, 1937	\$ 1,798,092	\$ 1,616
March 31, 1938	4,957,103	71,087
March 31, 1939	5,370,665	245,036
March 31, 1940	6,080,902	297,736
March 31, 1941	9,465,451	431,501
March 31, 1942	11,631,705	592,135
March 31, 1943	12,712,333	367,654
March 31, 1944	16,909,735	466,709
March 31, 1945	22,798,218	486,653
March 31, 1946	16,975,009	398,973
March 31, 1947	18,436,305	1,359,593
March 31, 1948	25,802,853	1,152,579
March 31, 1949	26,088,523	1,115,960
March 31, 1950	19,602,984	302,209
	Add: Portion of metal profits set aside in prior years to offset copper loss	150,000
		152,209
March 31, 1951	35,112,901 Net Transferred to earnings retained	\$1,922,136
		150,000
March 31, 1952	42,657,818	1,772,136
March 31, 1953	54,632,976	1,753,651
March 31, 1954	44,114,825	2,008,321
April - June Quarter	9,641,198	1,637,787
July	2,213,645	235,299
August (Est.)	3,211,000	8,197
July-Sept. Quar. (Est.)		82,000
1st & 2nd Quar. (Est.)		210,000
		445,000

[fol. 5083]

## ROME CABLE CORPORATION

The breakdown of sales before deduction for discount and freight for April to August 31, 1954, with August figures estimated, are given below:

	April-August • 1954	April-August • 1953	\$ Increase or (Decrease)
Rods	\$2,068,000	\$2,614,631	( 30.9 )
Bars	2,226,000	3,127,484	( 28.8 )
Weatherproof	961,000	1,325,569	( 27.5 )
Magnet	1,048,000	1,378,221	( 24.8 )
Rubber Covered	4,174,000	8,449,579	( 24.9 )
Torrance - E.M.F.	751,000	815,720	( 7.9 )
T.V. Mast	180,000	268,547	( 32.4 )
Rigid	684,000	192,318	255.7
Spiral & Aluminum	823,000	2,781,094	( 70.4 )
	891,000	755,842	6.2
	\$15,806,000	\$21,903,954	( 27.8 )

Torrance figures are presented below: (• August 1954 figures estimated)

	April-August • 1954	April-August 1953	\$ Increase or (Decrease)
E.M.F.	\$719,151	\$783,955	( 8.3 )
Elbows	6,257	6,757	( 8.0 )
Mechanical Tying	33,835	25,048	24.8
Rigid - Elbows & Couplings	14,527	1,377	955.0
Rigid - Conduit	665,643	191,695	247.3
T.V. Mast Tubing	166,666	262,246	( 36.5 )
	\$1,606,079	\$1,271,338	26.3

The operating figures for Rome and Torrance are noted in the tabulation below:

	April-July	August Est.	April-August 1954 •	April-August 1953
<u>Rome Plant</u>				
Net Earnings	\$232,175	\$68,000	\$300,175	\$214,066
Less Net Profit transferred to Reserve	-0-	-0-	-0-	65,000
Net Retained	\$232,175	\$68,000	\$300,175	\$149,066
<u>Torrance Plant</u>				
Net Earnings	\$11,321	\$10,000	\$21,321	( \$30,066 )
Reserve	-0-	-0-	-0-	-0-
Net Retained	\$11,321	\$10,000	\$21,321	( \$30,066 )



[fol. 5084]

**ROME CABLE CORPORATION****OPERATING FIGURES (Cont'd.)**

<u>Company</u>	<u>April-July</u>	<u>August Est.</u>	<u>April-August 1954 *</u>	<u>April-August 1953</u>
Net Earnings	\$243,496	\$78,000	\$321,496	\$783,980
Less Net Profit transferred to Reserve	-0-	-0-	-0-	65,000
Net Retained	\$243,496	\$78,000	\$321,496	\$718,980

I point out the fact that this year our July operations included an unusual two weeks vacation.

The backlog of orders shows a marked drop from January 30th to May 31st, particularly due to "Spiral Four".:

		<u>Value</u>
January 30, 1954	Rome - Wire Products	\$2,255,000
	Aluminum	274,000
	Spiral 4	1,269,000
	Torrance - RMT	49,840
	Rigid	1,980
	T.V. Mast	130,200
		\$3,818,280
May 31, 1954 :	Rome - Wire Products	\$2,318,000
	Aluminum	298,000
	Spiral 4	100,000
	Torrance - RMT	3,980
	Rigid	27,400
	T.V. Mast	-
		\$2,747,380
August 7, 1954	Rome - Wire Products	\$2,206,000
	Aluminum	394,000
	Torrance - RMT	25,600
	Rigid	154,000
	T.V. Mast	32,750
		\$2,812,350

In addition to the above we have received a contract of \$1,845,000 for "Spiral Four", shipments to begin April 1, 1955 and to continue through March 1956.

**ORDERS AND SALES**

The order picture continues to improve. Total copper contents without considering "Spiral Four" order are about 20 per cent ahead of July a year ago and brings the total for the first eight months to about 8 per cent behind the same period a year ago. It is our belief that incoming orders for the calendar year 1954 will exceed 1953.

I deplore the suffering and loss caused in New England due to the hurricane of August 31st. We are receiving rush orders for wires and cables to help restore electric services in the stricken areas. These rush orders, largely for Weatherproof, will probably result in increasing our sales in the month of September by approximately \$200,000.

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**ROME CABLE CORPORATION****ORDERS & SALES (Cont'd.)**

Because of the two weeks vacation shut down sales hit a low point of the year in July. August level will run approximately average for the first quarter, but September should run over 20 per cent above that. The present quarter, however, as a whole will be about 7 per cent below our first quarter of this fiscal year. Excluding "Spiral Four", sales in the current quarter should about equal that of a year ago, with indications that the following quarter will exceed a year ago.

**ROME PLANT OPERATIONS**

Sales have been on a much reduced scale but in recent weeks are showing evidence of an improving trend which I hope will continue for the balance of our fiscal year.

**PRICING SITUATION**

There have been four small price changes in the badly affected building wire items. Net overall effect is an increase of 7-1/2 per cent from the low reached in June. To accomplish these there have been four separate price rises and with each rise the loss from raiding of consigned stocks is a very considerable item.

**MATERIALS**

With the 16 day Kennecott strike having been settled and several other companies having signed labor contracts, we expect to have sufficient supplies of copper to meet our customers' requirements. Even if the Anaconda strike continues, we should be in a comfortable position with nine active suppliers. Aluminum is in very plentiful supply and other materials are readily obtainable.

**CAPITAL EXPENDITURES**

The following E.R.'s have been approved since the last meeting of our Board:

<u>E.R. No.</u>	<u>Description</u>	<u>Amount</u>
1631	Purchase from Signal Corps an Air Compressor	\$ 3,030.69
1632	Purchase from Signal Corps a Power Distribution System	26,969.31
1633	Purchase five room air conditioners	1,420.00
1634	Purchase 22 Friden Calculating Machines	9,518.00
1635	Purchase and install 4 Bench Stranders with payoffs	30,000.00
1636	Purchase and install plastic cabling equipment	10,000.00
1637	Purchase and install a Robertson Lead Extruding Machine	82,500.00
1638	Purchase and install preformers	3,600.00
1639	Purchase and install dome type vulcaniser	31,500.00
1640	Purchase and install a lead stripper	15,000.00
1641	Purchase labor and materials to clear site for Bldg. No. 22, etc.	61,300.00

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[fol. 5086]

ROME CABLE CORPORATIONCAPITAL EXPENDITURES (Cont'd.)

<u>E.R. No.</u>	<u>Description</u>	<u>Amount</u>
1642	Purchase and install a built-in Corona Level Equipment	\$ 7,500.00
		<u>\$282,338.00</u>

PAYROLL STATISTICS

Payroll statistics are given below and show the effect of reduction in hours and the end of our "Spiral Four" contract. We regret that this "Spiral Four" contract was not carried out as we had been led by the Military to believe it would be. This closing necessitated the loss of a number of valued employees.

Factory payroll statistics for Rome and Torrance are as follows:

<u>Week Ending</u>	<u>No. Employees</u>	<u>Total Payroll</u>	<u>Avg. Weekly Wage</u>	<u>No. Salaried Employees</u>
<u>ROME</u>				
9/27/53	M 989	\$80,150.93	\$81.04	
	F 88	7,272.13	59.91	412
	1077	<u>\$87,423.06</u>		
2/7/54	M 961	\$71,992.95	\$74.91	
	F 71	3,526.01	49.66	417
	1032	<u>\$75,518.96</u>		
8/1/54	M 835	\$63,313.64	\$75.55	
	F 27	1,623.32	60.12	419
	862	<u>\$64,937.16</u>		
<u>TORRANCE</u>				
9/26/53	141	\$12,600.49	\$89.37	34
2/6/54	147	12,229.28	83.19	30
7/31/54	130	12,003.77	92.34	30

TORRANCE PLANT OPERATIONS

Glenn Koger has been at Torrance for about two months now and we are very pleased with the manner in which he is taking hold.

Torrance sales in the current quarter will set a new record and should run better than 25 per cent above the last quarter.

It would be nice to be able to report that all of our troubles are over there, but I think it best to say that excellent progress is being made. There has been very little trouble with the furnace. It now has a capacity beyond the current production rate of the tube mills. Rehabilitation and replacement of rolls on the tubing equipment were found necessary owing to a poorer program of maintenance.

[fol. 5087]

**ROME CABLE CORPORATION****TORRANCE PLANT OPERATIONS (Cont'd.)**

Gil Woodill has found some interesting potential prospects for industrial tubing, which if realized should very substantially improve operational results.

**LABOR RELATIONS**

Effective August 9th we granted a voluntary five cents hourly increase to all hourly workers and an equivalent amount to salaried workers in addition to improving hospital allowances from \$9.00 to \$10.00 per day. These allowances were approved by the Executive Committee at a meeting held on August 5, 1954.

We are still negotiating with I.A.M., Local #1875, representing maintenance workers, to complete a new contract. The expiration date of the old contract was August 3rd.

On August 26, 1954, the National Labor Relations Board supervised a consent election for production workers in the Rome Plant to determine recognition with I.A.M. to represent them through their Lodge #157 in Utica. The Union lost the recognition election by a vote of employees 557 "No" and 116 "Yes" (or 82.7 per cent of total vote). Only one vote was challenged and one vote voided out of a total of 701 eligible employee voters. Conditions prior to and during the election were quiet, and good relationship was maintained and is still being maintained with the employees and the labor organization.

I think the result of the voting of our employees mentioned above is a great tribute to Ross Fraser, Charlie Ellis, Gerald Comerford and our supervisory staff in the factory. It shows that they have continued to cement the pleasant relationships that have existed with our working people over the last eighteen years.

**HENRY STREET CROSSING**

The Henry Street raising project is proceeding rapidly and provided the weather holds out it should be completed within two weeks. This will effect the level cross-over connection between Building No. 15 (Rubber Covered) and the new Shipping and Storage Building No. 22.

The new Shipping and Storage Building No. 22 is estimated to be completed and ready for occupancy the early part of December. Bids are now being received which indicate the cost of the 90,000 sq. ft. building should not exceed \$400,000, including installation of the railroad section within the building, the black top entrances and parking area for truck loading and standby, both within and outside the building.

**CAPITAL EQUIPMENT PROGRAM**

The capital equipment program and rearrangement of departments should proceed along the following schedule:

All purchases and delivery of new equipment by April 1, 1955.

Departmental rearrangement should be concluded by late 1955.

[fol. 5088]

**ROME CABLE CORPORATION****"SPIRAL FOOT"**

On August 4th we were notified by the Philadelphia Office of the Signal Corps that on our bid of \$102.50 per quarter mile length we had been awarded three-quarters of the total procurement for the year April 1, 1955 to March 31, 1956, or a total of 18,000 units with a total value of \$1,845,000. The opportunity to bid on this changed our plans regarding storage of equipment and delayed finalization of contract. The Signal Corps have agreed to pay us \$26,000 per year for storage of equipment with change when equipment is activated, to be on a proration of value basis. Officials of the Signal Corps will be here September 13th to review the details of the rehabilitation contract.

A ruling issued last week by the Office of Defense Mobilization presents what should be more attractive possibilities to cover strategic standby facilities such as ours. These matters will be discussed with the Signal Corps on their next visit.

**RENEGOTIATION**

The Renegotiation Board has asked for additional data so that final determination is in the same status as the time of my last report.

**CONSULTANTS**

By mutual consent our arrangement with Mr. J. C. Ward, Jr. has been discontinued. This is due entirely to the fact that Mr. Ward, now President of Vitro Corporation, is so immersed in the details of his business that he would not have the time to give to our affairs.

**RESEARCH**

Our Research Department is continuing to work closely with the Air Force and has recently been asked for a study of a suitable connector for a cable with Polyethylene sheath replacing Neoprene. Several orders have recently been received for a new cable, Reseal Flame Resistant Polyethylene. With all the new materials available it is necessary that continuous study be made to keep abreast of the times.

**AMERICAN SYNTHETIC RUBBER COMPANY**

There have been no further developments on the American Synthetic Rubber situation, except that Essex Wire has been added to the wire mill group. We do not expect to know how successful our bid will be until early 1955.

**EARNINGS AND DIVIDENDS**

At our last Board meeting I presented figures covering the five years ending March 31, 1950 to and including March 31, 1954. Average per year net earnings were \$1,524,000 while dividends averaged \$486,000, or 31.2 per cent. While our earnings during this present quarter will touch a low point, we believe that the third and fourth quarters of our present fiscal year will show steady improvement in sales and earnings.

I recommend the continuance of our present rate of 35 cents per share on the Common Stock payable October 1, 1954 to stock of record September 17, 1954, following which the usual action should be taken on the Employee Dividend payable at the same time at the same rate per unit.



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[fol. 5089]

**ROME CABLE CORPORATION**

**ALUMINUM SITUATION**

Our aluminum business has grown in importance, the year ending March 31, 1934, exceeding the prior fiscal year by approximately 30 per cent. We believe this growth will continue for some time in the future. The aluminum officials have advised Mr. Fraser at a meeting held in April that they had no present plans to go into the insulated aluminum cable business themselves and assured us that if their policy changed they would try to give us one year's notice. I have the feeling that our business with them will probably not continue indefinitely and that we should carefully study whether or not it is to our ultimate advantage to continue such an uncertain situation indefinitely. This subject is one of great importance to us and should be given our most careful consideration.

**BONUS PLAN**

At our last Board meeting I appointed a new Bonus Committee and anticipate we shall have a report from them at this meeting. I am confident it will be of great interest as your Committee, consisting of Messrs. Fraser, Collins, Kroeger, Jack Dyett and A. D. Manning, has studied this matter not only very carefully but they have had full advantage of all the studies on this subject that have been made in our office during the past year.

**LONG TERM LOAN**

Our Company entered into agreements with J. P. Morgan & Co. Incorporated, The Connecticut Mutual Life Insurance Company and Massachusetts Mutual Life Insurance Company for \$4,000,000 to be repaid by serial notes over a period of fifteen years. Morgan participated to the extent of \$1,000,000 payable in semi-annual installments of \$125,000 each commencing February 1, 1935, interest 3 per cent per annum. The insurance companies each participated in \$1,500,000 to be repaid at the minimum rate of \$250,000 annually on each August 1st during the period 1939 to 1968 and the balance of \$500,000 maturing August 1, 1969 with interest at 3.9 per cent per annum.

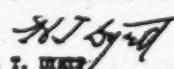
After the payment of a \$1,000,000 short term loan on September 15th we will have no other borrowing indebtedness.

**THE FUTURE**

I quote the following from a letter of August 13th signed by Mr. Fischer Black, Publisher and Editor of ELECTRICAL WORLD:

"Practically unanimous is the agreement that the inherent growth probabilities of the industry indicate a doubling of its business by 1964 and a tripling by 1970."

Respectfully submitted,

  
H. T. DWYER  
Chairman of the Board

[fol. 5090] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 93

9/13/54—HTD:AS

Memorandum of Conversation at My Home with Ralph Davies, R. Murray Willard ("Jess"), J. H. Dyett and Myself.

I asked Ralph if he felt that our company was giving full cooperation and he said "so far as I know. I should say that the cooperation between the two companies were perfectly satisfactory with, of course, the little usual troubles on each side." I asked him if they had any plans or were contemplating making a study of doing their own insulating. He said he had not heard a word on this subject, he did not think it was being investigated in any way and he assured me that if it did become of interest he would estimate that from the time he told me that they were giving it consideration that it would probably take them six months to make a thorough study and one year to get their equipment into operation. He promised me that he would notify me the moment they started to investigate equipment. He quite appreciated that we were entitled to all the time that they could give us if they reached a determination to go ahead with their own insulating.

He then spoke of the Southern Electric Company as the bad boy that was causing quite a little trouble. He had heard rumors that one or more of the principals in the company wanted to sell. He did not believe that they were operating at a profit at the present time. He thought they had continuous trouble on their rolling mill and so far as he knew they had not solved this trouble yet. He seemed to agree with me that Al Tessmann was a good man. He asked what I thought of the other principal and I replied that I did not feel that I knew him well enough to say much about him. I, therefore, did not express any opinion. However, I think he was able to get the impression which I feel is mutual that he would not make a desirable man to tie up to. He felt that the Southern business had been built up from the start by price cutting and he believed under the present

management it would probably continue along that line. Ralph said he hoped that if they sold that that would sell out and fall into strong hands who would cooperate. I rather thought that this might be some little indication that his *could* would not be adverse to our stepping into the picture there.

Ralph asked how the Properzi equipment was operating. I expressed my own individual opinion that we had made quite a little progress in the last few months but I thought it would continue to be little changes here and there that would eventually produce high quality at a reasonable cost. I made the remark that if the Properzi turned out to be very satisfactory and if Alcoa continued their present policy of selling aluminum at a delivered price all over the country that there might come a time when, if our relationship with their company continued, we might discuss with them the desirability of a small Properzi wire drawing and insulating plant somewhere in the south or the west. I asked him if he had ever given this any thought and if so I would be interested in his thinking regarding a location that might be of interest. He mentioned their new Texas aluminum plant was opening this summer and thought that that would be a very desirable location.

Ralph asked me what I thought about the price of copper. I told him Jack knew a good deal more about the copper situation than I did but between Jack and myself we gave him the understanding that we expected a price drop in copper in a year or two. We did not believe from what we had heard it was liable to have a serious effect on the price advantage now enjoyed by Aluminum Company.

[fol. 5091] Jack asked him what effect they expected at Massena due to the proposed state development of power. Ralph stated that as the work progressed that they would lose their cheapest power development on the St. Lawrence and that it would be a very harmful thing to the Aluminum Company. After talking it over I made the remark that it seemed that the only fair thing to do was to attempt to assure Aluminum Company that they would be given at least the opportunity to contract for the same amount of power they were not using at the present cost price that they now enjoyed. Ralph made the significant remark that the build-

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ing industry was now accounting for about 18 per cent of all the aluminum sales.

Ralph could not have been friendlier and before he left he urged me to come down to Pittsburgh with you some time and see the transformation that has taken place in that city.

[fol. 5092] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 95

To: R. A. Gray  
From: E. Mark Wolf  
Date: March 17, 1955  
Subject: R. E. Uptegraph Mfg. Co.

CC: R. A. Schatzel, F. S. Marks, G. E. Rolston, J. R. Woods

Dear Dick:

The question of aluminum vs. copper for electrical conductors is doubtless going to spread to other fields as the spread in price between the two metals increases. Fortunately, in the case of transformers, we have a pretty good background to work from because of previous work with Westinghouse and Moloney.

The magnet wire coverings which we supply and the equipment which we use are not sensitive to the type of conductor involved. All of these coverings can be applied equally well to copper and aluminum, and the quality of the coverings will be about equal in either case. We have noted no significant difference in bonding of glass coverings between the two metals.

Because of design considerations involving size and weight, the economics of the situation up to the present time have not justified the use of aluminum conductors in liquid cooled transformers. In the case of air cooled transformers, however, the economics apparently looked interesting when copper was 30¢.

In actual production trials certain unforeseen increases in time and labor largely nullified any apparent advantage with aluminum. The people I have talked with generally have felt these problems could be solved with experience.

Aluminum magnet wire apparently winds more easily

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than copper. However, because of its lower mechanical strength it is desirable to depart from dead soft wire and increase hardness to the point where windability is affected. This point is reached at about 17,000-21,000 lbs./sq. in., which is only about  $\frac{1}{2}$  the tensile strength of soft copper. More blocking and supporting of the coils is necessary with aluminum because of its lower strength, but this problem is readily solved.

The major item which involves increased cost is joints. In the past aluminum to aluminum joints have been made by inert-arc welding, which is a more expensive operation than the usual carbon block brazing employed with copper. Aluminum to copper joints have required silver plating of the copper. We think other methods of joining may be developed to solve this problem.

While delivery problems are not in my department, I have talked with F. S. Marks, who advised that promises may run 1 to 2 weeks longer than copper magnet wire.

E. Mark Wolf

EMW/jbb

[fol. 5093] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 96

Meeting Held May 3, 1955—Subject: Aluminum

Present: Messrs. A. D. R. Fraser, C. H. Ellis, G. E. Rolston, R. A. Schatzel and J. H. Dyett.

C.H.E. advised that we could have a 600,000 lb. monthly capacity on a two-shift basis. He has received recently encouraging reports both technically and manufacturing-wise. An additional furnace would be required but this should improve costs and give us insurance against shut downs.

R.A.S. pointed out that in order to arrive at one-half million pounds minimum monthly we would have to make certain assumptions that we would have the following product list:



1. 3/8 and 7/16 rods in coils (or reels).
2. H.D. wire H19 sizes .061 through 2.
3. Solid or Stranded H26 size 14 through 500 M Stranded.
4. Triplex and line wire.
5. Insulated building wire and RR to 500 M.

In his opinion we can continue to use an electric induction furnace if we can be sure of getting the same purity aluminum. We have had no trouble since the metal has been cleaned up. Spout trouble has ceased. Mr. di Lustro of Anaconda stated that if they were independent and could get Alcoa metal he would recommend putting in a 30,000 lb. reverberatory furnace. Holding the metal would be necessary. Revere is planning on going to a 30,000,000 lb. capacity monthly. Reverberatory furnace is cheaper but we should have 2,000,000 lbs. a month. Consequently, Mr. Glesmann has recommended that an electric furnace would be better for us. Nichols is using two Ajax furnaces and two 5,000 lb. swindle ladles. He expects to have one hour's holding time for 2500 lbs. an hour.

We must get assurance of Alcoa first that they can continue to supply the pure metal which comes in as EC 99.55 but actually is considerably purer. We set the specification on what we are receiving but Alcoa says that if we actually specify 99.70 we would be charged one cent additional and two cents additional for 99.8. It was pointed out that we should prepare for 1,000,000 lbs. a month. A.D.R.F. said that he would present the problem to Messrs. Davies and McGee, telling them that they have developed a metal which is good for the Properzi and wondering if we can get more. A.D.R.F. wondered if we could offer to pay a premium. According to R.A.S. he did not know whether or not we could use other materials with the swindle ladles.

C.H.E. pointed out that the Properzi cost was 6.22 per pound in March as compared with  $6\frac{1}{2}$  cents cost of rod from Alcoa. That 6.22 cost is with no piece work. In producing 12,800 lbs. in eight hours the cost should be reduced to  $5\frac{1}{2}$  cents, while on a two-shift basis it would go to 4.7 cents per pound. Overhead is 7 to 1 on 6.22 cents,  $6\frac{1}{2}$

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to 1 on  $5\frac{1}{2}$  cents and  $5\frac{1}{4}$  to 1 on 4.7 cents. A.D.R.F. pointed out that this was still high. C.H.E. agreed on this but pointed out the power load. With a large 5,000 lb. package only 30 per cent man load on the Elevator Supply. We can get 2,000 lbs. of aluminum an hour on size 8 with this man load. We could use one or two more machines. C.H.E. stated that we could take one of our old heavy intermediates, which however is hard to pry loose, and a light intermediate which we have already set aside. He feels we are inadequate in drawing at the present time.

[fol. 5094] R.A.S. thought that we should stop producing building wire at size 6. According to C.H.E. we should give the Sales Department a chance to sell at the rate of 2,000 lbs. an hour before we spend any money on new machines. G.E.R. said that .077 for #4 strand is the biggest size required. C.H.E. thought we could be competitive with a small capital expenditure.

It was R.A.S.' opinion that we should have two furnaces in any event. Mr. Glesmann knows of three on the west coast ready to be uncrated at about \$19,000 each. To this would be added the installation cost and the labor. Our present furnace cost us about \$70,000. Mr. King at Vancouver favors the reverberatory furnace.

The question of selling rods is a new problem to G.E.R. Fabricators cannot afford to pay 28 cents for rods and compete on ACSR (there are only 16,000,000 lbs. a month of this sold in the country, and only 2,200,000 lbs. a month in covered aluminum wire). Simplex can't buy aluminum and supply Triplex and break even. At the present time we are accounting for about 10 per cent of the covered aluminum wire in the country. We might possibly get some rods from Okonite. G.E.R. pointed out that we would only get 40 per cent as much on the covering of aluminum building wire as do for copper owing to a bad pricing situation.

In view of the sales picture C.H.E. thought we should emphasize lower costs with minimum expenditures for the next three months. A maximum of \$15,000 should be spent for drawing, in his opinion. A.D.R.F. will plan to see Ralph Davies on May 9th. G.E.R.'s best guess would be about 50,000 lbs. a month use at Okonite and Hazard.

(Other subjects.)

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On reverse lay R.A.S. stated that we would have to sign a license for \$5,000 before we could get into the Okonite plant to see the operation.

C.H.E. recommended that we go from 70 to 95 units of Spiral Four a day and run out the contract two months early. This should provide lower costs. According to A.D.R.F. this sounded satisfactory but J.T.S. should be consulted.

JHD:AS

[fol. 5095] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 97

A. D. R. Fraser  
R. A. Schatzel  
May 3, 1955  
1954

Activity in the field of Research, Development, and Engineering affects most products and processes, as well as the evaluation (testing) and application of our products for useful purposes.

In expectation of the transfer of rubber plants from Government to private operation, many companies accelerated their research in high Polymers. With the actual transfer having been accomplished, Research activity under private operation has been greatly increased. Many new and improved types of rubber and plastics, as well as compounding agent for modifying the properties of these materials are being turned out at an ever-increasing rate. These are bound to have a great impact on our processes and products. We have a vantage point of contact by our association with American Synthetic Rubber Company.

With the gyrations of the copper market and the relative stability of the aluminum market, as well as its increased supply, a greater interest in aluminum has been engendered. Our development of aluminum from ingot to insulated conductor has progressed well. The problems of quality have been overcome and the problem of cost reduction is now one of volume. Industry studies of safe

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operating practices of aluminum conductors are well on the way to completion. Aluminum is now ready to take its place as an accepted conductor for electrical distribution.

During the year we completed another phase of our survey of Airport Lighting Cables for the U.S. Government. The recommendations for an insulated conductor were accepted and we are now completing the final phase, the development of proper means of connection which constitutes a complete system of Airport Lighting Cable and installation means.

The growth in the use of Butyl rubber insulation has increased, as has also the growth in use and supply of Polyethylene; our Laboratory has developed a new plastic sheath—RoSeal—which combines improved mechanical and electrical protection to cables at a reduced cost.

While the Mining industry has been at low ebb, the interest in better cable has been greatly accelerated. This is often true as an industry slows down. As a result of our industry cooperation with the Mining industry, in which we had an important part, new designs of Mining cable were developed, and improved methods of evaluation which will result in greater safety, as well as a more reliable service in this industry.

The developments at Torrance have been largely those of cost reduction. However, several mechanical improvements were completed in the making of Rigid Conduit [fol. 5096] which have resulted in the filing of two patents. We feel confident other patents will result from developments now well under way.

R. A. Schatzel.

RAS P



[fol. 5097] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 98

To: C. H. Ellis  
From: R. M. Fraser  
Date: August 16, 1955  
Subject: Aluminum

Cc: R. A. Schatzel, F. P. Baumler, G. L. McCutchan, G. Pirk,  
W. Schneible, C. Baker, R. Schiller, Dr. Fuller, L. Fitler,  
G. Commerford

Yesterday afternoon Messrs. Schatzel, Baumler, McCutchan, Pirk, Schneible, Baker, Schiller, and Dr. Fuller met with you and the writer to discuss the production of aluminum rod and wire.

Charlie Baker reported that present average daily production in a 9 hour day is 15,000 pounds, and at this rate it was estimated that we could produce on a 2<sup>nd</sup> shift basis 600,000 pounds per month.

You stated that we should aim at a production of 1,000,000 pounds per month.

There was considerable discussion regarding the best type of melting and holding furnaces and other details of production. The objection to gas fired reverberatory type of melting furnace is the necessity of purging the melt of hydrogen, which process produces chlorine gas which would be very objectionable—especially at this location, and the neutralization of which would be costly and present many other problems.

Rudy Schatzel reported that he had several discussions regarding this matter with members of other organizations, and in particular reported a conversation with Louis Glesmann of Revere in which Mr. Glesmann recommended for production ranging between 500,000 and 1,000,000 pounds per month the use of electric induction melting furnace with Swindell ladles or holding furnaces. He would recommend the reverberatory type furnace only if production requirements exceed 2,000,000 pounds per month.

I was instructed to obtain quotations on an induction melting furnace having a capacity of 2,500 pounds per hour and 2 holding pots.



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We will also investigate other types of electrically heated furnaces.

It was also decided that I should further investigate the Waterbury-Farrel continuous rolling machine.

It was reported that Nichols Wire & Aluminum Company of Davenport, Iowa, have a new Ajax melting furnace with Swindell ladles in operation, and I am to make arrangements for a group to visit that plant in the near future to observe operations.

Assurances were given that the roof of the reconditioned Building No. 1, in which the aluminum operation will be located, would be of suitable height to provide proper ventilation and improved working conditions.

[fol. 5098] Frank Baumler brought up the matter of drawing the additional production of aluminum rods, and he was advised that our budget contained an item of \$46,000.00 for a new drawing machine.

R. M. Fraser.

RMF k

[fol. 5099] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 99

Minutes of the Executive Committee of Rome Cable Corporation August 17, 1955

A meeting of the Executive Committee of Rome Cable Corporation was held on August 17, 1955 at 10:00 A.M.

There were present: Messrs. Bernard, Collins, H. T. Dyett, J. H. Dyett, Ellis, Fraser, Rolston and Schatzel. Mr. J. H. Dyett acted as Secretary of the meeting and read the minutes of the Executive Committee meeting of August 15, 1955 which were unanimously approved.

The following E.R.'s were unanimously approved:

C-249, C-250.

Mr. Ellis explained the savings in this fiscal year's E.R.'s over the estimates and discussed the additional aluminum equipment which would be required to give 1,000,000 pounds a month. He emphasized the insurance factor of another

furnace for production of 500,000 pounds a month. After discussion, upon motion duly made, seconded and unanimously carried, it was

Resolved, that the sum of \$165,000 be and hereby is appropriated for the full reconstruction of Building No. 1 as proposed by Mr. Ellis on August 15, 1955.

Mr. Fraser presented a Pension Plan outline to all Executive Committee members with the request for suggestions. There followed a discussion of participation in the Executive Bonus.

Mr. J. H. Dyett presented a proposed salary change schedule and merit increases which would bring total general and merit salary increases to approximately \$8,000 a month. After discussion, upon motion duly made, seconded and unanimously carried, it was

Resolved, that the general rate schedule as presented by Mr. Dyett be and hereby is approved, and it was further

Resolved, that the merit salary change as listed below be put into effect on the dates given, for the balance of the fiscal year.

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[fol. 5100]

Name	From	To	Effective
B. Palliwade.....	\$328.50	\$360.00	Per Mo. September 1, 1955
J. Reick.....	338.50	370.00	"
K. Murray.....	478.50	520.00	"
V. Nacewicz.....	253.50	275.00	"
T. Neilsen.....	368.50	400.00	"
F. Rahrig.....	618.50	660.00	"
M. Shannon.....	253.50	275.00	"
J. Patenaude.....	243.50	265.00	"
C. Gerack.....	428.50	455.00	"
J. Commerford.....	315.00	340.00	"
D. Williams.....	458.50	490.00	"
M. Sleeman.....	438.50	470.00	"
G. W. Commerford..	800.00	850.00	"
A. Keefe.....	368.50	400.00	"
E. Secs.....	418.50	455.00	"
J. Duffy.....	383.50	420.00	"
R. Mumpton.....	343.50	370.00	"
S. Martin.....	358.50	390.00	"
R. Rolston.....	358.50	390.00	"
W. Hojnacki.....	538.50	575.00	"
J. Thomas.....	418.50	450.00	"
R. G. Poole.....	633.50	670.00	"
A. H. Sawyer.....	428.50	455.00	"
J. H. McCann.....	668.50	710.00	"
F. G. McKevitt.....	698.50	740.00	"
M. Bylin.....	428.50	455.00	"
L. H. Selden.....	538.50	570.00	"
P. Isom.....	428.50	455.00	"
K. Pitts.....	363.50	385.00	"
E. K. Duffy.....	618.50	670.00	"
R. Frank.....	283.50	305.00	"
S. Lynch.....	438.50	475.00	"
G. Marwick.....	498.50	530.00	"
G. Brodock.....	508.50	540.00	"
P. Lopushinsky.....	448.50	475.00	"
F. Henze.....	558.50	590.00	"
David Smith.....	408.50	435.00	"
E. B. Jones.....	383.50	415.00	"
E. Gilmore.....	408.50	435.00	"
A. M. Mitrovich.....	588.50	640.00	"
A. J. Dawson.....	508.50	540.00	"
M. A. Tuohy.....	253.50	275.00	"
G. E. Rolston, Jr....	478.50	510.00	"
E. Pfizenmaier.....	268.50	290.00	"
R. T. Edwards, Jr....	538.50	570.00	"
E. C. West.....	448.50	475.00	"
J. Mitchell.....	440.00	465.00	"
Florence Sheridan....	273.50	290.00	"
J. J. Glenn.....	468.50	495.00	"
J. S. Scheppach.....	483.50	510.00	"
R. D. Golly.....	638.50	700.00	"
T. C. Spriggs.....	630.00	680.00	"

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Name	Present Rate	To	Effective
John Franke.....	\$383.50	\$410.00	Per Mo. December 1, 1955
C. E. Walden.....	425.00	455.00	"
Pat Thomas.....	253.50	275.00	"
G. W. Commerford.. (See above)		900.00	"
Pat Wall.....	243.50	265.00	January 1, 1956
G. June.....	253.50	275.00	"
N. Wightman.....	328.50	355.00	"
F. Murphy.....	438.50	470.00	"
P. Short.....	438.50	470.00	"
E. Sudol.....	438.50	470.00	"
J. Boyce.....	288.50	320.00	"
M. Settle.....	508.50	550.00	"
L. Fidler.....	783.50	850.00	"
J. McCormick.....	383.50	425.00	"
M. Kopehik.....	475.00	500.00	"
T. E. McCarthy.....	385.00	415.00	"
C. Scherzi.....	283.50	310.00	February 1, 1956
E. Palmer.....	375.00	405.00	"
E. B. Jones..... (See above)		445.00	" (To cover field assignment)
R. Terzini.....	488.50	525.00	March 1, 1956
H. Yingling.....	508.50	550.00	"

The rates listed above under "Present Rate" do not include the general increase to become effective September 1st.

There being no further business to come before the meeting it was adjourned.

John H. Dyett, Acting Secretary.

1949

[fol. 5102] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 102  
**ROME CABLE**  
 CORPORATION  
 ROME, N.Y.

REPORT SUBMITTED TO THE BOARD OF DIRECTORS  
 OF ROME CABLE CORPORATION AT THEIR MEETING  
 SEPTEMBER 7, 1955

I present herewith net sales and earnings by fiscal years up to  
 March 31, 1955, the April - June quarter and by months to date:

<u>Fiscal Year Ended</u>	<u>Net Sales</u>	<u>Earnings</u>
March 31, 1937	\$ 1,798,092	\$ 1,636
March 31, 1938	4,957,103	73,087
March 31, 1939	5,370,665	245,036
March 31, 1940	6,080,902	297,736
March 31, 1941	9,165,451	431,901
March 31, 1942	11,631,785	592,135
March 31, 1943	12,712,333	767,654
March 31, 1944	16,909,735	1,66,709
March 31, 1945	22,798,218	1,86,653
March 31, 1946	16,975,009	398,973
March 31, 1947	18,436,305	1,359,593
March 31, 1948	25,202,853	1,152,579
March 31, 1949	26,088,523	1,115,960
March 31, 1950	19,602,984	302,309
	Plus: Transfer from contingency reserve	150,000
		157,209
March 31, 1951	35,142,901	Net \$1,922,136
	Minus: Transfer to copper reserve	150,000
March 31, 1952	42,657,848	1,772,136
March 31, 1953	54,632,976	1,753,651
March 31, 1954	44,114,825	2,008,321
March 31, 1955	39,186,095	1,637,787
April-June Quarter	11,687,152	379,847
July	3,838,914	161,718
July-Sept. Qsar. (Est.)	13,733,000	150,000
	First Six Months Est.	\$ 830,000



1950

[Vol. 5103]

## ROME CABLE CORPORATION

Breakdown of sales before deduction for discount and freight for April to August 31, 1955, with August figures estimated, are as follows:

	April-August - 1955	April-August 1954	% Increase or (Decrease)
Rods	\$ 2,161,000	\$ 2,065,045	4.7
Bare	3,168,000	2,237,319	56.4
Weatherproof	1,299,000	957,224	35.7
Magnet	1,449,000	1,049,407	38.1
Rubber Covered	8,547,000	6,122,922	39.6
Torrance - E.M.T.	1,146,000	764,331	50.0
T.V. Mast	125,000	178,314	(29.8)
Rigid	1,180,000	705,445	67.4
Spiral &	768,000	822,545	(6.6)
Aluminum	1,416,000	962,131	47.1
	\$21,599,000	\$15,864,683	36.1

Rome has operated since my June report to the limit possible with available copper. I believe we have been as amply provided for as possible under present circumstances. We hope copper will begin to flow more freely within the next quarter. You will recall that in my June 15th report I stated our budget for the current fiscal year indicated an anticipated 15 per cent increase in the physical volume of sales. In the last five months this figure was 22 per cent compared to an increase of 36 per cent in dollar sales.

Torrance figures are presented below:

	April-August - 1955	April-August 1954	% Increase or (Decrease)
E.M.T.	\$ 1,016,000	\$ 738,719	37.5
Elbows	10,000	6,399	56.2
Mechanical Tubing	120,000	19,213	524.6
Rigid - Elbows & Couplings	45,000	16,562	171.7
Rigid - Conduit	1,135,000	688,883	64.7
T.V. Mast Tubing	125,000	178,314	(29.8)
	\$ 2,451,000	\$ 1,648,090	48.7

The profit in July at Torrance was abnormally high because our sales jumped to \$814,000, which was double the average monthly shipments. On sales of \$400,000 our profit would be about \$24,000 per month. However, we expect later this month to make a contract with the Pittsburgh Steel Conduit Company under which they would take their west coast requirements from us, amounting to \$600,000 to \$1,000,000 per annum. This should have a beneficial effect on our future earnings. While this arrangement will help us at our Torrance Plant it still leaves our company without the ability to sell conduit at a profit in the eastern market. This is something that we shall continue to study and hope for a solution later.

[Vol. 5104]

**ROME CABLE CORPORATION.****BACKLOG OF ORDERS**

January 30, 1955

Rome - Wire Products	\$2,327,000
Aluminum	527,000
Spiral &	1,825,000
Terrance - E.M.T.	22,000
Rigid	30,000
T.V. Mast	-

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\$4,753,000

May 31, 1955

Rome - Wire Products	3,921,000
Aluminum	623,000
Spiral &	1,640,000
Terrance - E.M.T.	44,000
Rigid	75,000
T.V. Mast	-

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\$6,303,000

August 20, 1955

Rome - Wire Products	3,138,000
Aluminum	932,000
Spiral &	1,077,000
Terrance - E.M.T.	365,000
Rigid	427,000
T.V. Mast	33,000

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\$6,272,000

Incoming orders for the first eight months this year show a 46 per cent dollar gain over a year ago.

**COPPER**

On August 17th Amecanda Copper Company changed their copper price from 36 cents to 40 cents per pound, and on August 25th they raised their price from 40 cents to 43 cents per pound, shortly followed by similar action on the part of Phelps-Dodge. Kennecott increased its price to the 43 cent figure, effective September 1st. We are not unconscious of the fact that the price of copper is the highest it has been during my lifetime, and we shall carefully bear this high price in mind and try to protect ourselves as thoroughly as possible, so that we do not get badly caught some time in the future. Consumers are paying over 50 cents per pound for nearby copper, but we are staying clear of this premium copper except where our customers request it. Steel and aluminum are both in short supply, and we are having difficulty to protect ourselves fully for anticipated enlarged requirements. I believe, however, we are doing all possible to guard against metal shortages.

**ALUMINUM**

It is evident that with copper at or near its present price the use of aluminum is going to grow very rapidly. We have done considerable business with Alcoa on a toll basis and while we have no assurance of long continuance of this business, we are hopeful that we may be able to retain at least a very large portion of it. I believe with conditions as outlined that we will

[fol. 5105]

**ROME CABLE CORPORATION****ALUMINUM (Cont'd.)**

shortly have a meeting with Ralph Davies, Vice President in Charge of Sales, and his sales manager of wire and cable products, here in Rome - I hope by the end of this month. Our Rome Plant does little or nothing in the manufacture and sale of ACAR transmission cable. This might be a large item if we were located in a portion of the country where large buying of this type takes place and our costs permitted us to compete at a profit. This is a subject of great importance to us for the future. I have thought for at least five years that we were handicapped by having only one wire and cable plant. Present freight rates handicap us in meeting competition in many territories. I believe this is a subject for very serious consideration in the coming twelve months. I think we will gather some very interesting information from Mr. Davies when he is here and that certain information which our Mr. Ellis has secured this past week should be thoroughly discussed at this meeting.

I will ask him, after our formal portion of this meeting is over, to bring up the possibility of acquiring two Proprietary units and furnaces at a price of approximately \$150,000, which represents approximately 60 per cent of what new equipment would cost. I understand that the above equipment under discussion is the property of Anaconda Wire and Cable Company which has been in service a comparatively short time and is in good condition, and which at present is surplus equipment to them on account of a new very large aluminum rolling mill installed by the Anaconda Copper Company out in Montana. I feel that after you have listened to Mr. Ellis' story that we will be warranted in giving him power to enter into the proposed purchase. Mr. Ellis expects to be able to get the final story on this proposition tomorrow. Therefore, we must consider this matter seriously today.

**LABOR SITUATION**

The Executive Committee approved an increase in labor rates of six cents per hour to all hourly workers effective August 29, 1955. We also approved certain upward revisions in specified job classifications. Increases to salaried workers to meet these new conditions were made effective September 1, 1955.

The Executive Committee approved a modification of the Employee Dividend-Sharing Plan to include a new Profit Sharing Trust arrangement. They also approved a Pension Plan. In addition improvements were made in the hospital, surgical, medical and accident health programs. The total improvement will amount to approximately a cost of 15 cents per hour. The above improvements were offered to maintenance workers represented by International Association of Machinists, A. F. of L., and accepted by them as containing the improvements in the new contract which will be negotiated prior to October 7th.

All of the above charges approved by the Executive Committee had been thoroughly discussed with our directors at their last meeting and approved in substance. I believe that our present agreement with our workers puts us well in line with other local plants and with our industry in general.

[fol. 5106]

**ROME CABLE CORPORATION**

Our Company factory payroll figures covering number of employees, total weekly payroll, average weekly wage, as well as number of monthly salaried employees at both Rome and Torrance are shown below:

<u>Week Ending</u>	<u>No. Employees</u>	<u>Total Payroll</u>	<u>Avg. Weekly Wage</u>	<u>No. Salaried Employees</u>
<b>ROME</b>				
9/26/54	M 862 F 22 884	\$79,904.19	\$90.39	413
2/6/55	M 840 F 22 862	71,500.32	82.95	414
8/14/55	M 854 F 37 891	73,440.79	82.42	419
<b>TORRANCE</b>				
9/25/54	139	14,146.53	101.77	31
2/5/55	136	12,109.35	89.04	33
8/7/55	125	11,641.38	93.13	38

**CAPITAL EXPENDITURES**

Major equipment already ordered but not received is as follows:

- One heavy Larneth strander to improve our production volume - necessitated by higher aluminum cable production.
- One large lead extruder and dome vulcanizer for same - to expand our product line.
- One large cabler to expand product line and manufacture cables up to 61 wires. This will be particularly suitable for control cables and will permit us in one operation to put on layers of 6, 12 and 18 wires. This, with the center wire, would give us a complete one-operation cabling of 37 wires.
- One special reverse lay cabler for aerial cable.
- One large tripling machine to increase output of Triplex cable.

The above equipment is scheduled for delivery between September 1955 and April 1956.

The Executive Committee at a meeting held August 17th approved the expenditure of \$165,000 for the rehabilitation of approximately 14,000 sq. ft. of Building No. 1. This important improvement should be completed within the calendar year 1955. It would transform a very old building to a much better building with higher head room and with an inside railroad track. The new

[88. 5107]

## ROME CABLE CORPORATION

CAPITAL EXPENDITURES (Cont'd.)

building with added height will permit better and safer operation of our Properal aluminum equipment including electric furnaces. The estimated cost of this building will approximate \$5.00 per square foot.

We are presently endeavoring to get accurate estimates for all costs in connection with increasing our equipment for aluminum rod and drawing capacity to a safe million pounds production per month figure. We are now procuring costs for an additional electric furnace and holding ladles and a heavier rolling mill. These additions would give us the possibility of turning out about one million pounds of aluminum per month at lower costs than at present. At present volume we are producing aluminum rod at 2.1 cents per pound under the present purchase price for aluminum rods. We believe that this new equipment will permit us to expand our business and secure competitive costs.

I am attaching to this report a list of the E.R.'s approved since the June 15th meeting of our Board.

SPIRAL FOUR

Our production on Spiral Four is at the rate of approximately \$150,000 per month.

MARKET SITUATION

We expect the heavy demand for wires and cables will continue throughout the current fiscal year. Owing to the very high price of copper we expect a greater and greater interest will develop in the use of aluminum wires and cables.

REARRANGEMENT OF PLANT

The plant rearranging program is proceeding as scheduled.

- a) The complete synthetic extrusion department has been removed from Bldg. No. 15 to Bldg. No. 20, including five present machines and an additional new high economy extruder for competitive plastic wires.
- b) The complete Reflex department has been removed from Bldg. No. 15 to Bldg. No. 20.
- c) Three-quarters of the Magnet Wire Dept. has been removed from Bldg. No. 4 to an improved section of Bldg. No. 1. The Magnet glass wire machines will complete this department move to Bldg. No. 1 by September 15th.
- d) Partial movement of the Receiving Dept. from Bldg. No. 7 to Bldg. No. 1 has been accomplished. No further movement in this change will take place until the rehabilitation of Bldg. No. 1.
- e) Spiral Four has been removed from the main floor of Bldg. No. 20 to the basement of Bldg. No. 20 for both production and storage.

Of course, all of the above changes were preceded by the erection of the new Bldg. No. 22 for Shipping and the removal of that department from Bldg. No. 1 to Bldg. No. 22.



[Vol. 5108]

**ROME CABLE CORPORATION****PRODUCTS**

At my request Mr. Holston on August 26th presented me with a very thoughtful report listing each major product class and the products under such class which we now produce; also a suggestion of those items which he would consider as suitable for our consideration as additions to our line at some time. I will quote from his report on Magnet wire:

"I believe that the time is rapidly approaching when we will have to give serious consideration to the question of enamelling wire, both synthetic and regular type. There are definite indications that enameled types of covering are now gaining favor for transformer work which represents a large portion of our business."

Under telephone wires and cables he states:-

"We have already produced the plastic telephone cable in small quantities and have authorized the purchase of new cabling equipment."

I think we all realize this represents an opportunity with the cabling equipment now on order.

Under aluminum wire he states:-

"Due to the high copper prices now prevailing, very serious study should be given to the use of aluminum in many of the copper products we now manufacture with copper."

**POSSIBLE CHANGES**

We had a little discussion with the officials of a prominent wire company on the subject of a possible merger, the discussions being confidential and purely exploratory. Since that meeting we have had no definite sign that the party with whom we talked has any great amount of interest in this subject. I personally feel it is exceedingly doubtful if anything comes of it.

**PENSION AND BONUS PLANS**

You are all familiar with the adoption of our Pension Plan which with our Bonus Plan will be subject to full review at this Board meeting.

**DIVIDEND ACTION**

I recommend payment of our 66th dividend at the regular rate of 35 cents payable on October 3, 1955 to share owners of record of September 19, 1955.

1956

[fol. 5109]

ROME CABLE CORPORATION

LISTING ON NEW YORK STOCK EXCHANGE

I give below the earnings for the first quarter of the present fiscal year and the figures for 1954:

	<u>1955</u>	<u>1954</u>
1st Quarter (April-June)	\$ 379,847	\$ 235,000

Our estimate for the second quarter 1955 is \$450,000 as compared to \$177,000 last year. This gives us a total for the six months of \$830,000 compared to \$412,000 in 1954. The six months earnings this year are at the rate of \$1.63 per share of Common Stock.

Our price structure looks more favorable than last year at this time, and the present indications are that for months to come we can run our plant as full as materials will permit.

I have discussed this matter with our Finance Committee and we are unanimously in favor of making our application for listing. If our Board approves this suggestion, we should authorize our officers to take suitable action.

PRICES AND FUTURE PROSPECTS

Prices on certain products have recently been improved, and I believe that under present conditions we may anticipate a slight improvement in our profit margins, at least for the next few months.

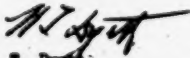
GENERAL

At this meeting it is customary to designate the members of the Executive Bonus Group for the current fiscal year.

This year fourteen students have been granted Herbert Thomas Dyett scholarships, bringing the total number receiving aid in the current fiscal year to 38 young people.

I would like to have Mr. Schatzel, either before or after luncheon, bring us up to date on any new development projects that we will be able to offer after our insulating department is completed late this calendar year, and also to advise of the very important work he has been doing on standardization.

Respectfully submitted,

  
H. T. Dyett  
Chairman of the Board

HTD:AS

[fol. 5110]

E. R's approved since the last meeting of the Board, June 15, 1955:

<u>NOTE</u>	<u>E.R. No.</u>	<u>Description</u>	<u>Amount</u>
	1714	Design, construct and install a reverse lay cabling machine	\$ 15,000
	1725	Materials and labor to construct a pit furnace with stack connected to boiler house breeching and a steel supported roof over the rubbish collecting deck	7,800
	1726	Purchase and install a band saw in the Reel Repair Shop	1,400
	1727	Purchase one portable electric welding unit	600
	1728	Purchase and install two 50 VS Reliance control units for supplying D.C. Current on Vaughn C.I. machines	9,000
	1729	Construct a new superstructure over portion of Bldg. No. 1	165,000
	1732	Purchase and install suction fan and ducts on roof of Bldg. #11	1,100
	1733	Purchase and install two suction blowers to improve ventilation of basement in Bldg. #20	4,200
	1734	Purchase and install one 100 K.V.A. Lighting Transformer	<u>1,000</u>
			\$ 205,100

TORRANCE

C-248	Construct dumping base for special containers to be fitted to Ford Truck, and purchase 10 special containers	\$ 732
C-249	Purchase Westinghouse Air Conditioner	250
C-250	Purchase and install Far-Air Package Coolers	<u>3,819</u>
		\$ 4,801

Additional E.R's approved:

NOTE

1684-A	Over-expenditure on 4 1/2" plastic covering unit	\$ 785
1688-A	Over-expenditure on purchase and installation of bins, shelving, etc. for relocated Receiving Dept.	573
1698-B	Over-expenditure on 4 Reflex paper wrapping machines	<u>575</u>
		\$ 1,933

1958

[fol. 5111].

9/8/55 - H.T.D. 122

I read the attached statement to the Board and it seemed to be unanimously approved with the exception of Mr. Krueger, who suggested he thought it possible to make a deal with Gnomite. I told him this was contrary to what Al Vets had told me in my office and that I personally thought that it was very questionable if he would change his mind in this respect.

I again stated I felt that our organization would be happier running its own affairs and that we could pick up possibly one or two small companies in special lines and add to our own facilities in a new location, so that I felt our organization might not only be happier but our stockholders fully as well off as if we tried to merge with any company.

[fol. 5112]

INFORMAL REMARKS FOR THE BOARD MEETING 9/1/55 -

H.T.D.:as

I have given a great deal of thought to the present merger situation and have attempted to analyse the conditions I foresee if anything comes of the discussion started with one or two other companies. My feeling is that if a merger of three companies of somewhat similar size comes about there are many headaches and perhaps a bit of unhappiness and a political situation started that might be exceedingly unpleasant.

I have personally come to favor a very careful survey of what our own Company could do by expansion, possibly picking up one or two small companies who would add to the breadth of our line and would give us another location where we might do a certain amount of insulating at some later time. I believe at the present time we are too concentrated into one location. Freight has become a more and more important factor. I have believed for the last five years that we should have another plant, the location midwest, far west or southwest, to be carefully analyzed by our Sales and Manufacturing Departments before we attempt to reach any conclusions.

I would very much like to have a full and informal discussion on this subject as to whether or no we should keep our own strong, happy organization in control but attempt to broaden our line and to open at least one more factory in some other location.. It is my present thought that such a course holds better and happier promise for our executives and a continuance of our progress for our stockholders. If I find you are in agreement with me it will entail much careful study and analysis before we could begin to arrive at any firm conclusions.



[fol. 5113] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 103

1955 Sales

E. Mark Wolf

Thank you Rudy. Well I'd like just to quite briefly go over some of the things that have happened this last year in the field of our industrial accounts, and in getting into that subject, I want to say what I have thought for a long time, that we've got more to offer potentially in that field than we're finding a place for. I think we've got quite a little to offer to these industrial accounts and electrical manufacturers—quite an impressive list of people that we've worked with, other than Magnet wire users—and in each of these cases we've been able to learn their problems and their processes and work with them—develop special little gimmicks in manufacture that give them what they need and each time we go into a new spot we carry some of that experience with us. I really think we've got a lot to offer to this class of people and it's business that I think all of you would like to work with, once you crack one of these accounts. You end up earning the everlasting gratitude of the people you work with because you've solved their problems; in many cases you're not in a highly competitive field because you're making something specially suited to their needs. That's the way we work with people like IBM, Westinghouse, Singer, General Railway Signal, Louis-Allis—there's quite a long list of them.

Let's talk just for a minute about Magnet wire and some of the things that have been going on—it's a subject I always like to talk about because I think we really have something to be proud of and I say this from my experience in getting around in the plants where our Magnet wire is used and seeing the product that our competitors are furnishing, and I still can say, as I've told you before, that there ain't nobody that makes the Magnet wire as good as Rome Cable does. I wouldn't say that if I didn't mean it. I give you one example of how that thing works out. I went with Jack Woods to an account down near Pittsburgh

a few months ago, where we were not selling Magnet wire, but he knew that they used it and we were interested in seeing what could be done. They were having a great deal of trouble with Silicone glass which is true with many manufacturers of rotating equipment and stationary equipment, and when we got down in the plant it was rather easy to see that the product they were using was in no way comparable to ours. Four different manufacturers were supplying their Silicone glass and, (I'm not exaggerating), I don't think there was a reel in that plant that would ever get out of our Inspection Department; so we started talking with these gentlemen about our Glass Magnet Wire, and when we got through he said, "Well, if your wire is half as good as you say it is, you've got yourself a new customer. Send me a sample." So I came back and had Dave Wright cut about a 15-pound sample off of one of our regular runs and sent it down to him, and it was just about two weeks ago that Jack got his first order from this customer. All he had to do was try our wire and he found . . . . RAG—I believe Mark that company just moved into the Pittsburgh area. EMW—That's right, it's a new development down there, a transfer of an operation into that area. But that sort of thing in one way or another has happened many times.

As you know, all those of you that have Magnet wire accounts, we've introduced this green tracer on our Magnet Silicone Glass Magnet Wire in the last year as a means to help these people identify Silicone glass from the regular glass in their plant. That move got many of our competitors a little sore at us and made all our customers love us, and I think that's the way it ought to be.

[fol. 5114] Glass Dacron is a new product that we've introduced this last year, and as most of you know, the first product of that kind was introduced by Phelps Dodge along about December or January. It's very much like regular Glass Magnet wire, except that instead of putting a 100% fiberglass covering on it, the covering is plied; it's made up of about half fibers of Dacron and the other half fiberglass, and the heat of the baking ovens fuses the Dacron and produces a tighter bond to the copper, a harder, tougher exterior surface—the magnet wire that seems to stand the abuse that is necessary in winding coils for rotating equip-

ment. We're making it, and I think in every way the product we're making is comparable to or better than what's being offered by others. The bulletin that you received from us sometime ago, I think, stated the case fairly well, and everything in that bulletin is still true. We're finding in general, transformer people are not too much interested in it because they're perfectly satisfied with what they've got, and find that people making rotating equipment are interested in it because it solves some of these tough winding problems.

$\frac{3}{4}$  lap paper is another Magnet wire we're very proud of here. As some of you know, the development of the  $\frac{3}{4}$  lap paper Magnet Wire, as we see it today, and as a product that's not too high priced—that development largely took place here. I think we originated the use of the type equipment that all manufacturers are now using for this wire, and just to show you the kind of talent we're able to bring to bear on that, I wanted to tell you one thing that's happened internally here. One of the problems in making this wire is to get this paper on without wrinkles. Wrinkles affect dimensions, and they make the wire more susceptible to damage during winding, and one of the things that is needed in putting this paper on is a proper nosepiece and polishing head on the machine. I don't know how many different types of nosepieces we developed here in an effort to solve the problem. They all improved it a little bit, but none of them completely cracked it. We still were head and shoulders above our competition, but none of us were doing the job that needed to be done. Then one of the operators of our paper machines got interested in the problem; it happened that he and his father had a small machine shop at home, and one morning he came in and handed Dave a nosepiece that he built at home in his spare time and wanted to know whether we could try it. So it was put on the machine experimentally, and while there were some faults in it, it was the first real step that we'd been able to make—it looked like a positive improvement. The thing went through several revisions—all at home in this fellow's shop, and the result was that this nosepiece is our standard piece of equipment now. I wish you could compare  $\frac{3}{4}$  lap paper coming out of this plant now with our competition, there's no comparison. That fellow was

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talked to personally by both Charlie and Ross. He's now working in our Industrial Engineering Department. We've got a lot of talent here in the plant and I'm kind of proud of the fact that we're finding ways to use it.

The only other thing I wanted to mention in the line of Magnet Wire was Aluminum, and I'm not going to spend [fol. 5115] much time on it, except, to tell you that unquestionably there's going to be a great deal of interest in Aluminum Magnet Wire with this price differential between aluminum and copper. It isn't the kind of product that you can go out and sell until the man that's using Magnet wire says he's interested in it, but if you haven't already heard that from your customers, you're going to hear it. But remember when those requests begin to come in that as of today, we have had more experience in the manufacture of rectangular Aluminum Magnet Wire than anybody else in the country, through the experience of working with the Westinghouse plant down in Sharon for the year and a half or two years when they were actually making aluminum wound transformers. I think that experience is going to hold us in very good stead.

I'm always supposed to mention the subject of complaints. This year I think our situation on complaints has been considerably better. I think our plant has done a grand job in correcting many of the things that needed to be corrected. I thought I'd like to mention a couple of instances that have come up this past year that show that complaint isn't always a bad word. We've had some complaints that I think have eventually worked out to our advantage and of course, to the advantage of the customer. These are complaints of the type where a study is instigated cooperatively between ourselves and the customer; the result in each case has been some improvement in what we're doing here, and a great deal of appreciation on the part of the customer for our co-operation. We are going through exactly that situation down at the Sharon plant of Westinghouse on rectangular copper, where they had a general complaint with all of their suppliers on the quality of rectangular copper. I think the work we've done with them was very much appreciated down there, and we know here that we've gotten a lot of good out of it—we're making a better flat wire today than we ever made. The same thing has



been true up at the Buffalo plant of Westinghouse on rods. We're now in a similar study down at Penn Transformer on the condition of Magnet wire reels and we'll talk a little more about that when we talk about Packaging on Friday, but there again, we've earned the customer's respect and appreciation and we've improved our own lot.

Well I'm not going to take any more time on these subjects, and I think I'll turn the next part of this section of the program over to Lew. He's got several things he'd like to cover. Lew Selden.

[fol. 5116] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 104

Rome Cable Corporation  
1955 Sales Conference

"Our Industry—And Us"—A. D. R. Fraser

I feel somewhat apologetic about the fact that I have had to come to this meeting not as well prepared as usual. I hope sometime I will be able to enjoy one of these meetings and spend a little more time with you. There have been a few things going on, however, that have required my attention in other places. It is rather an important thing, I think; that represented at this meeting are 30% of the total shares of the Rome Cable Stock. So I may be a little bit rough in certain respects in some of the things I say, but it is being done in your interest as share owners and your interest as employees.

I would be indeed remiss if I did not very sincerely acknowledge the fine job that Glenn, Fred, Rudy, Mac, Bob, Dwight and several others have done in all the arrangements that were made.

I am a little bit disappointed in this meeting, at two things; one, that we haven't stressed a little bit more on how we are doing and I haven't found as much of the panel discussion as we did have in some of the other meetings. I always got a great deal out of getting information from you at first hand. It seems as though we in Rome have



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had to do more of a talking job than in some of the other years. I know you have had a tough year and we had a lot of ground to cover and we have tried certain experiments, but that's just merely my impression.

Coming back to the matter of the figures. You knew about the budgets we made out for the year and the budget for the current fiscal year, that is April 1 to March 31, projected was up 15% above a year ago. Now those figures have been corrected to take care of the price increases, they have been corrected to take care of the copper increases and anything of that nature. Whenever those things happen, figures are corrected. Fifteen percent roughly in volume was expected to be the overall increase for the year. I am very pleased to tell you that we are doing a little better than that on the budget. Up through August, even with the shortage of copper, with all the things that you have heard that have been in our way, we are 3% ahead of that. You know, we don't just accept the dollar figures or the quantity figures on your sales projections. They are carefully reviewed by several here at Rome. We look at it as potential production, manpower, equipment and financial needs. We, as you know, also have an expense budget for each of the main departments this year and when you get all those things together, you may ask, "How are you going to do; how are you going to make out profitwise?" I am very happy to tell you that at the end of five months, we are running 10 to 15% better than we figured we were going to be by that time.

Now that's good, it is a good trend, but you heard quite a few pitfalls, potential troubles that can hit us with the situation in copper. It doesn't take very many million pounds of copper at 4¢ a pound difference, buying it at 47¢ and selling it at 43¢ to make quite a difference in the overall results.

The orders for the five months in the fiscal year are up about 28% or so above the same five months a year ago and we were beginning to have a pick-up in orders at this time about a year ago. The Kroeger order chart, with which you are familiar—the red line is that of industry generally, the blue line is ours. It is based on a moving average. One reason for our dip down here (reference to chart) is

because we haven't been able to enter all the orders we could have because we have only entered them on the basis of the orders that we have thought we had sufficient [fol. 5117] copper to produce. However, you see the general trend is up. We are apt to be more heavily affected than industry generally as we were here because of the inventory liquidation but now, as you see, we are well ahead of the pace on the inventory overall picture of industry.

Financially, we are very solvent as Harry told you. Harry made a new record in collections the other day. It was a million-and-a-half or so dollars in one day—a million-and-a-half dollars! You realize just about twenty years ago today, a little later than this, we were talking about how we were going to raise approximately two million dollars to start the Company. It is quite something to ponder on. Of course, they are different dollars, but they are the dollars that we have to work with. Let's not forget we still have a big debt of about four-million dollars, part of which was incurred for Torrance and part of which was incurred for consigned stocks. We heard something about consigned stocks earlier and you will hear more about this before I get through.

We might look at this almost twenty-year record—the sales in the first year were less than two million. This year we expect they will be well over 50 million, and the net worth at the beginning of the company was less than two million. By the end of this year, the net worth of the Company will exceed 15 million dollars. Our organization has, we believe, been strengthened during the year. You heard of some of the changes. There is no one who could be more delighted than I have been with the way in which the whole group has taken the bumps. Last year was a rough year. I think, frankly, we had about the poorest record of any wire company in the business and that is not normal for us. I told you the other day, that in 1938, when all the companies were losing money and we were only two or three years old, we were one of the few who made money, but there was a story back of last year. We were doing a lot of holding line. We got out of the small company-class. The influence of our policies and our actions could have made a much worse debacle out of last

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year's results if we had chosen not to hold the line and not to try to get a better industry than we seemed to be having.

I haven't been around here as much this year. I have been doing a lot of traveling, not the kind of traveling that I would like to do to your districts, nor the kind of traveling out in the mill that I would like to do. I have had to do certain other special jobs. And I want to pay particular tribute to Jack who, as Executive Vice President, has been carrying on. I have delegated job after job to him. He has taken over well and taken off my shoulders a great many responsibilities and has done an outstanding job working with the other top people in the Company. I have absolutely no qualms about being away and doing some of the other jobs. I know that they will be carried on well and better than if I were here myself.

Capital expenditures—yes, we are still spending money. You see what we are doing to the old bare wire building, we are revamping it, we are also going to add to our aluminum production and what you heard about aluminum certainly indicated that there was need for some revision—some [fol. 5118] additional capacity there. Incidentally, we have spent approximately 11 million dollars or so on capital expenditures in the last 11 years and that is a pretty heavy pace for a company of our size in the ploughing back of the money that was made.

Employee relations have been good. We had troubles at Rome and we are currently having some potential trouble at Torrance, some more organization work, we don't know how it will come out.

During the year we announced a revision on the employee dividend plan and what we think is one of the most forward-looking pension plans that is in operation today, together with a profit-sharing trust. We haven't got all the details available on that. Those things have been worked out again on the old Rome Cable principle of endeavoring to get the best that we can within our ability to pay.

I was very pleased with the Engineering report. I like the way Bob said it. "Not much new in products but more and better with what we have." I think we went through a period of adding so much to our product line—we got a little bit ahead of ourselves and we had an awful lot of

headaches and an awful lot of troubles. I think what has happened in this particular period is that we have consolidated our position, we have worked harder on the quality end. The returns picture is much better than it has been, I think, since the Company started. We, on the other hand, from what you saw from Rudy, Mac, and Bob, have been working on other new things that are going to mean something in the future—but I again say let's not go off half-cocked until they are fully ready—until we have the equipment. Let's not promise things until we have got good assurance we can produce. Let's not go through another Tree Plex, another Rigid Conduit, let's be a little surer of our ground. And you know that I am a gambler, not to match up with some of you boys in your games around here, but in the business world, you know that I am willing to take chances.

Remember that laboratory exhibit which is very, very impressive and let us do a little digging into the fact that at the present time in Rome we have two-hundred product classes—two-hundred product classes: Each product class may have dozens and dozens of sizes and types of wire under them. Now I told you this last year, as far as I know, nothing has been done about it, but in that set-up, 35% of that number of product classes are giving us less than 6/10th of 1% of our total sales. These items individually total \$12,000.00 per year. Now you can't make very much wire today on a thousand dollar per month total for a production class. When you go up to \$24,000.00 a year, the figure goes up to 46% of the total number of product class or almost 100 product classes gives a grand total of less than 1½% of our business. Now I know that we take certain jobs because we want to get in with a good customer and to get experience in running certain products, but in this period of scarcity, in this period when the mill has a big problem of rescheduling to keep going for regular customers, can't we do just a little bit more on investigating of what is the value of spreading ourselves so very thin? I feel that there is a lot of "gold in them thar hills" and it would mean paying better dividends.

[fol. 5119] On the material side, it took 65¢ of the sales dollar last year to pay for materials and supplies. You heard Jack's story. It is going to be probably a larger



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amount because of the higher price of copper this year. An excellent job of taking care of our material requirements has been done by Jack and Stan. The aluminum picture has presented problems. We think we have licked most of the problems of the production on the Properzi. You have heard of what we are going to do in expansion. The economics of aluminum over copper will mean further usage of aluminum. Then we hit the matter of supply. Then we hit the matter of how we are going to reconcile the economics. Gentlemen, I would not be very happy for Rome Cable to have the Company entirely on an aluminum production basis based on the present prices on a switchover from copper. It would be a very, very sad Company as far as returns were concerned. So we have got a lot of things to be done in that connection.

The plant re-arrangement has gone forward apace, the boys have done an excellent job in manufacturing, engineering, we are looking and already seeing the benefit of many of the savings.

Now there is one thing that I understood was said that I would like to take just a little bit of an issue with—and that was that anyone was certainly crazy to be in the conduit business. Well I had something to do with that. We were told back in '36 that we were crazy to get in the wire business again. Industry was operating at 30% or 35% capacity and I can remember a New York banker going through our plant in the late 30's and saying we should certainly get out of the rubber covered business. We can remember it took us 40 odd months to break even and yet shortly after that, the Rubber Covered Department carried the Weatherproof and Bare Wire Department through a bad price war. I can remember a little bit about the cost in rejects and high costs in getting into high voltage. I can remember rather vividly—rather vividly, the fact that last year, the building wire, which we had made for a long time in which we had two-and-a-half times the volume that we had at Torrance that we lost 200 thousand dollars on it. So I am not discouraged about the Torrance picture.

Volume, when we had it in certain months, showed the potentiality there. Glenn Kroger has done a fine job. Ted Lewis has done a fine job in getting us established with the



industry and establishing out reputation with competitors. I think the policies in the conduit business last year were much better than some we had had in the wire and cable business. I like Dick Gates' enthusiasm. They have got a grand bunch of boys who want to be on the team and are on the team and I think we'll give Torrance a blue ribbon in the not too far distant future.

What we have learned from the meeting? Well, I guess we had better go out of the warehouse business from what the McGraw-Hill boys told us so we had better save some money on some warehouse leases, inventories and consigned warehouse stocks. Part of that debt that we built up was at your behest and right at the Sales Meeting time two or three years ago, we authorized the equivalent of over 4 million pounds of copper to go into that. Because we were operating on LIFO that meant a switch in inventory which accounting-wise kept our value of copper in inventory at a relatively low figure. Let's not forget that when you do [fol. 5120] increase your inventory, or replace it, you are replacing it at a higher level and I was alarmed, as some of the organization know, about this climb to 600,000 pounds above the level authorized. What happened? In the period between June and August, as Jack told you, we lost 2,200,000 pounds of inventory, that went out at lower prices. It costs us quite a pretty penny. Replacement of that at 43¢ or 47¢ copper can well represent  $\frac{1}{4}$  million dollars loss and if we are not able to replace that inventory on an overall basis, which we hope we can do before March 31st, Harry is going to have to dig up a little matter of over 250,000 dollars in additional taxes. The overall average of the cost of our inventory will move up 3 or 4¢ a pound so we mean what we say, it's your money you're dealing with when you give an extra amount on this consigned stock. I was amazed to find early in the year that we were getting about 1 and  $\frac{1}{2}$  times turnover on a lot of our building wire items. Because we had to have material going through the mill here, we had to have it in stock, we had to have it in transit to the warehouse, we had to have it in the warehouse and then we had to have three or four months in the hands of the jobber. Now that's not efficient. I won't go for this business of three months stocks with a consigned stock

where we have a warehouse also in that same city because in that event, you are going up to 4½ months stock in many cases and that is not good operation.

This question of inventories to me is an extremely important matter and it is extremely important that we get information back from you. If you find for example, that your customers are carrying too heavy inventories, get that back to the Sales Department so that we won't be operating overtime and then suddenly shut off.

Coming to our part in industry. Where do we stand? There are certain figures that are available. On copper, we have improved our percentage slightly this year despite the shortage, I mean our percentage of the overall total because of what Jack has been able to do. In building wire we are up slightly. We have about 3% of the total magnet wire business but we don't make a great portion of that product. It runs about 11 to 12% of what we make. We run about 5 to 8% of the NEMA power and control cable. Five percent of the portable cords, and on the overall with about 40 companies representing a major portion of the industry, on the items covered by NEMA, we run about 5%. We run about 8% of the aluminum covered wire business. On EMT 6 to 7% and in rigid 3%. Now, if we had a billion and a half industry, you have got some conception of where we stand from some of the figures that I have quoted.

Here you have the total of insulated wire and cable. (Reference to charts) These are NEMA charts and we have put the Rome Cable figures on them—the blue line is the Rome Cable—the black line is total insulated wire—the red line is total new construction—the green line is total electrical manufacturing industry and this goes up to 1955 and the figures to 1970 are going well above two billion dollars. You notice how the building wire follows the total of new construction here. Rome Cable figures fell off last year. You know why, but we are back on the trail again. Here is the trend of magnet wire business. Look how closely that follows the motors and generators sales, and the pos- [fol. 5121] sibility here we are off a bit because the enameled types represented a larger proportion than the other type coverings that we make.

You have heard about the NEMA job that I have. I just want to touch lightly on that and some of the things

that we have been doing, some of the things that I think are helpful for the industry. You have heard about the IPCEA being responsible now for the standards. If we are successful in this program we will have some real standards in the industry and you know that that will relieve a lot of your headaches. Frank McKevitt has headed up a traffic committee. For the first time, the wire and cable and the brass fabricating industry are working together to make some very effective savings in freight rates. We have had all the labor relations people in the various member companies in NEMA together to swap information covering important matters in labor relations as far as the industry is concerned. We had Jay down there last week on a matter of analyzing cost systems with regard to what is considered overhead and how inventories should be carried. We are trying to make it easier to satisfy the Government on the matter of cost analysis.

We also had a meeting of statistical and market analysis group. Out of that I hope that we will have an industry that will be as well informed as any in the country. The companies are enthusiastic about some of the things that we have been able to do. Copper has been a headache, but there again, in its initial stages, we were able to work with the brass mill. For years whatever the brass mills did the wire mills would do exactly opposite. We have been working very closely whenever we have gone along on a program alone, we have kept them informed and same is true vice versa. From my trip to Washington last week, I believe that there will be and we have seen some actual results on copper. There is some possibility also that if we can get a law in effect on involuntary liquidation of LIFO that many million of dollars will be saved to the industry. LIFO at Rome Cable means over a 3-million dollar cushion of what we have at the present time.

Coming to the growth picture, let's look at, let's say, the almost 20 years of our Company. Twenty years ago, the gross national product which was the output of everything was 72½ billion dollars. Well, the cost of government runs about that today. In 1945, ten years later, it climbed to 214 billion dollars. Today there is some actual predication that we may reach this year almost 400 billion

and by 1970, 567 billion. Electrical energy—(reference to charts)—electrical energy—remember at the start of Rome Cable, you have seen this chart before, we used it in our prospectus, we used in in the talk to Security Analysis, the production of kilowatt hours. We have capital expenditures of utilities on the green line. We have plotted the Rome Cable sales line as it actually has occurred in that period. We had a dip last year. Here is our estimated resumption of that line. This only goes to 1964 at some 800 billion—you carry it on to 1970 and you get a line that goes up to a new figure—a trillion-four-hundred and some odd billion kilowatt hours. Well, if this same story holds true, fill in your own figure.

[fol. 5122] The Federal Reserve Board index was at 47% in 1935, 107 in 1945, 136 today, and over 200 expected in 1970. Rome Cable Sales were nothing in 1935, 17 million in 1945, 55 million in 1955—what will they be in 1970 if we follow along that curve. Aluminum production 60,000 tons in 1935 almost 500,000 in 1945—a million-five in 1955 and 3½ million in 1970. Copper wire bars—259,000 tons the actual consumption of copper wire bars in 1935, was less than one-half what Rome Cable has consumed in the period since we have been in business, 570,000 tons in 1945, 800,000 tons in 1955, but their predictions on the usage of copper in 1970 do not climb anywhere near the way any of these other items.

You heard what the McGraw-Hill boys said about the potentialities of business. All of the things that are going to add up well for the wire industry. You have at your places, passed out before, a very fascinating story of forecast by the McGraw-Hill Electrical World staff from 1955 to 1970. You men of the Sales Department take it to heart and think of the potentials that you have ahead. You men of the factory take a look at it also as to what kind of plans we are going to have to make in order to meet that kind of demand.

But let's not be carried away entirely, let's approach this thing with care. I was not too young but what I heard the wail of the new plateau by many bankers, and many industrialists in the late 1920 period. I well recall that book that was published in 1933 by the very interesting title "Oh Yeah!" in which the quotes of these men



prominent throughout the country were given and it certainly was rather a sad picture, so there are a few things on the horizon that can cause trouble. These inventories can get out of hand. I believe that we have enough brakes on our economy today to cause us not as much concern. I believe the long term trend is well plotted but it behooves us as a company and each of you as a representative of the company to be on your guard. Let's remember '54. A lot of companies were having a pretty good year in '54. They didn't get the dip that we did. We went through some pretty rough times. By being on our guard, by doing some of the things that have been so ably discussed and talked about at these meetings this time and not forgetting them when we leave this room, we can learn a lot from 1954.

I go back to Jerry's remark about "Why should I worry about the thing, that's for the boys at the head office", but many of you are shareowners. I don't like this worry angle, I say "think" is a little better. Let's all of us do a little more thinking about our job and what we can do, let's use our heads a little more.

The matter of the fair advantage was quoted. Charlie Ellis and Jay Sarles remember a little bet that I had with them where I said, "I'd like to have a fair advantage" and the matter was indicated that we don't need a fair advantage. We do have a fair advantage. We have got this organization harmoniously working together. We have got the equipment. I hope you are all as proud as I have been during these last few days to hear the number of times that your Company has been mentioned as being first in this, first in that and it ran over a whole range of different things. The fair advantage is the reputation that you men have made for the Company. That, to me, is a real fair advantage in any selling job. We have had a success story that is envied. Let's keep it that way. As Harry Barnard said in his story, "Interesting, ain't it?"



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[fol. 5123] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 105

Mr. W. A. Miller—Phila.

Mr. G. E. Rolston—Rome


December 7, 1955

Philadelphia Electric Co., F.O. #A-14095

Dear Bill:

I have your memo of December 5 relative to the above mentioned order number and particularly with regard to the feeling that this customer has that our promises on this class of material are not reliable. I quite agree that they have every reason to feel this way and the information that I am going to give you is not in the nature of an alibi because we as a company are responsible for the promises and items that we agree to take. I do feel, however, that I should tell you quite frankly about this situation and properly tell you what we are doing to correct it.

In the first place, this plant has not been set up to draw aluminum wire in size smaller than .061. We only had one drawing machine set up for aluminum and was put in for the express purpose of making conductor to go into line wire and Triplex and as you know, the smallest size of individual wire strand going into those products is the size of strand into #6 AWG. About a year or year and a half ago, we were approached by the Aluminum Company of America to make some of the smaller sizes of stranded wire for them with TW insulation and in some cases, with RoMarine-RoPrene. Because of our other commitments and the insulating of their conductor, we felt that we could not refuse to do it and we set up purely on a temporary basis one drawing machine to produce some of the smaller sizes of wire. Our experience under this set up, of course, has been very unhappy and we have not done a good job on orders for this size from your customer nor have we done a good job for the Aluminum Company. Unfortunately our whole organization has not been completely aware of this situation and we now find that you and we are embarrassed by poor per-



formance on this particular type of wire. I will not attempt to go into all the other problems on discussions that have taken place with regard to outside diameter and tolerance, etc. because I am not qualified to do so and it would take an hour or two to try to reconstruct what has transpired, consequently, I am talking only actual making of the stranded conductor itself and in the case of this particular order that you are talking about, over one [fol. 5124] month of the delay has been caused due to that one source.

You now properly come to the question of what are we doing about it. I think we intimated to you at the time you were here at the Sales Meeting that we realize that we are going to expand our activities in aluminum wire and we told you of the new plant that we were building and the fact that we are putting in equipment to make a full range of sizes. This means that we will have not only the one original rod machine which was in our old set up but an additional intermediate drawing machine and twelve fine wire drawing machines. This work is pretty well along and I would say that in the next six weeks or so we would have a complete new operation for the drawing of the finer sizes of aluminum wire. I am sure that as soon as we get more and more experience in drawing these finer sizes that our difficulties of the past will either be eliminated or greatly minimized. I feel quite sure that we can convince you as well as any customer after we have set this thing up properly that we can do a job and keep reasonably close to promises which we make.

As I said at the outset, this is not going to solve the immediate situation but at least indicates that we are conscious of the fact that in order to take on items that are required by the trade that we must have a mechanical set up and the proper equipment to do it. I will have to speak for myself in this case when I say that I was distinctly opposed to trying to take on orders for products that were not within the scope of our mechanical equipment at that time and I think the results that we have had during the past months demonstrate just what has happened where we do take a gamble on some kind of a temporary set up.

I do not expect you to pass this information on to the

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Philadelphia Electric Company at this time but I do believe that when and if we have this complete installation going that we will be able to convince them that our capabilities are well in hand and possibly we can convince them that we should be given another opportunity.

Very truly yours, —, —.

GER:hc

[fol. 5125] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 106

A. D. R. Fraser

R. A. Schatzel

December 8, 1955

1955 Developments

### 1) Butyl Rubber

The desirable properties of this material has long been recognized. The difficulty of its processing has been a problem to overcome. Some of this has been due to non-uniformity in the rubber as received. This shows improvement which we hope continues. Compounding to fit existing equipment has also been a problem, and cannot be completely accomplished without mechanical changes and adjustments not required by other types or rubber.

We have made real progress in the understanding of these problems and have made progress in equipment and compound adjustments to enable us to manufacture orders for both high-voltage and R.H.W. insulation. With the adjustments in equipment now under way, solution to this problem should be accomplished.

### 2) Aluminum

Progress in the casting, rolling and drawing of aluminum has continued. We have drawn aluminum wire to #30 AWG and fabricated it into flexible welding cable, which is being evaluated by Lincoln.

Study of connectors for such cable is being made by both Rome Cable and the Lincoln plant.

Once again the use of aluminum Magnet wire is re-

ceiving attention, which will undoubtedly result in an increased selective use where engineering studies justify. We are in position to supply if evaluations or changes in economics can justify.

### 3) Mining Cable

The mining industry again is moving forward. We have developed an improved mining machine strand and cable within the present dimensional limits, and at little change in cost, which should go far to satisfy the demand of several years for a more sturdy and reliable cable for mining equipment.

### 4) RoFlex

Throughout the years there has been periodic complaints of lack of flame resistance, sticky wire, flaking at freezing temperature, dirty wire to handle, etc. on Non-metallic sheathed cable. Working with our supplier we have developed a finish which meets all requirements of performance and appearance. We are producing about [fol. 5126] 40% of our production at present and will be in full production when equipment is available in February.

### 5) Magnet Wire

We are accepted as one of the leading manufacturers of quality large round, rectangular and flat Magnet Wire; Paper, cotton and glass covered. We have never made enameled Magnet Wire. Within the past two years many of the problems of film coating large flat and square Magnet Wire have been solved. The synthetic enamels are tough and heat-resistant to a degree sufficient to warrant their use without other covering.

Film coated Magnet Wire for certain uses is replacing flat and square Magnet Wire to the extent of about 25%, and continuing to grow. In addition the use of film coated single glass covered wire is growing for some uses as replacement of double glass. It is therefore necessary for us to consider either equipping or to obtain a source of suitable enameled bare.

Study of enamel types and of equipment requirements.

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has been started. The field of enamel development is as broad or broader than the field of synthetic rubber, and while there is no single enamel which satisfies all needs, we believe by prudent judgment a single type covering can be selected to cover the basic requirements we will need.

#### 6) Silicone Rubber

There has been much progress in the development of these materials. Dow Corning have been recognized this year by the Chemical Engineering Industry for their outstanding achievement in building a laboratory curiosity (Bouncing Putty) into a going business in the space of 12 years. A growth from 50,000 per month to 6,000,000 per month in that time and still in its infancy.

The U.S. Navy has standardized on it and are endeavoring to have the British Navy do likewise. We are an approved supplier of such cable to Navy. We have manufactured one order on a plant trial basis. We have been complimented on its quality by the Navy. Further improvements in our methods have been made and work with the Navy has been invited by them to enable us to provide other types.

[fol. 5127] In addition to Navy, certain industrials are finding limited use for Silicone rubber insulated cable. This represents a new field of chemistry which will grow as our knowledge and Technology expands.

R. A. Schatzel.

RAS P



[fol. 5128] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 107

H. T. Dyett,  
A. D. R. Fraser,  
G. E. Rolston,  
S. O. Williams.

J. H. Dyett  
August 18, 1955

Alcoa Pig

This afternoon I talked with Jess Willard of Alcoa's Albany office and requested him to supply us with 400,000 lbs. of aluminum pig for each month of the fourth calendar quarter. Jess said that he had not yet been able to get approval of the 300,000 lbs. October order which we sent him.

At the present time Alcoa gives the Albany office only 600,000 lbs. a quarter to distribute in the pig or ingot form. We have been getting about 80 per cent of this. We have recently been able to get 300,000 lbs. a month owing to the relief the aluminum industry has been able to get from Government stockpile.

Jess made it very clear that in his opinion we should look towards another source. I explained the difficulties of trying to get a new supplier at a time when metal supplies were at an all time scarcity. He agreed with this but stated that Alcoa was not very anxious to sell aluminum pig. They wish to use their aluminum in more fabricated products. He stated that our requirements had jumped to such an extent that he could not see how Alcoa could take care of us. I explained that their requirements on us for wires and cables had jumped in the same way and that we were doing everything to meet their needs.

Mr. Wilmot has recently returned from a trip to the Connecticut Valley and was amazed at the projected plans of expansion which would demand large quantities of aluminum. In Jess' opinion there is just not enough production in the United States to take care of the requirements in the foreseeable future.

I asked Jess to relay our request to Pittsburgh at the

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earliest possible time. He said they would definitely not sell aluminum pig on a firm price basis. I brought up the fact that we had tried to place firm orders with Bill Stout between June 27th and August 1st, and Jess replied that he could not have accepted any during this period.

Ralph Davies is at present on the west coast and will not be back until after Labor Day. Jess suggested that Ralph should come to Rome shortly thereafter to discuss our mutual plans. Jess also intimated that he would like to be here at that time but I made no commitment.

JHD:AS

[fol. 5129] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 108

Notes on Visit of Messrs. Ralph Davies and Phil. Coffin  
to Rome on Oct. 4, 1955

Messrs. Davies and Coffin, together with Messrs. Willard and Stout of the Albany sales office of ALCOA and three other Pittsburgh representatives were in Rome yesterday.

Messrs. H.T. Dyett, J.H. Dyett, G.E. Rolston and A.D.R. Fraser met with the first four mentioned in the morning, at which point the main discussion was their ability to take care of our requirements for aluminum pig. We were asking for 400,000 per month for the last three months of this calendar year. Ralph Davies explaining the extremely critical situation in which they found themselves owing to a fall-down of ALCAN in supplying aluminum to ALCOA on their contract. He indicated that our usage of 400,000 pounds per month is an increase of 100% over our earlier requirements and that they did not have the metal. He indicated that they would endeavor to give us 900,000 pounds for the last quarter, which would mean 400,000 pounds in October and 250,000 pounds each in November and December. We indicated that not having made any efforts to get additional suppliers we were in a bad position with aluminum in short supply to get on the books of other suppliers and furthermore that even if we were able to get some metal we had to make certain tests

as to practicability of running. After much discussion it was finally agreed that they would supply us with 400,000 pounds in October, 300,000 pounds in November and that Mr. J.H. Dyett would make efforts to get some additional metal by December from other sources. Mr. Davies stated that they definitely did not want to be 100% supplier to anyone and made no commitment as to the percentage he would like to have of our business. I believe we can count on 300,000 pounds per month through the first calendar quarter of 1956.

[fol. 5130] It was indicated that aluminum is available on the Black Market and also that if we were able to pick up ordinary grade aluminum that possible arrangements for exchanging same for EC ingot could be set up.

We then went to lunch.

In the afternoon with Messrs. Davies and Coffin from ALCOA and Messrs. Rolston, J.H. Dyett and Fraser from Rome we discussed their requirements from us and how their program of production was planned. Mr. Coffin indicated that the first extruder for Polyethylene will not be available for delivery until late spring 1956. This was confirmed by Mr. L.T. Guest in conversation with Mr. Schatzel who stated that they would not be in production on Polyethylene for eight to nine months. Coffin stated that their second extruder would be available in August. Their twisting equipment would not be delivered for approximately one year. They are able to twist a limited amount of smaller sizes of Triplex in Massena now on a costly basis on a cabler. Therefore, we will continue to get Polyethylene business in sizable quantities for the next eight or nine months and it will be at least a year before they manufacture all of their Polyethylene. For the full year we will continue to get the larger sizes of Polyethylene that has to be twisted. On Neoprene they stated they have no idea of adding facilities for Neoprene and if they were asked to make a guess they would say at least two or three years and possibly never. This was also confirmed by Mr. Guest separately in conversation with Mr. Schatzel. They seemed to be questioning their ability to handle Neoprene. On Mr. Coffin's statement that they would have liked to have given us orders for 7,000,000 feet of conductor for October and November, because they needed

[fol. 5131] it for stock, I brought up the subject of their sizable stock increase of 50% since the end of July and that the walls of our shipping room were bulging with material. This seemed to surprise their entire group. I also indicated that we had produced for them in September approximately 8,500,000 feet and we had also made certain insertions in our production schedule at a penalty to our own customers' service when it was obvious that they could have substituted the running of that material rather than making it for stock. I tried to make this a very emphatic point with them and reverted to their conversation of the morning, that they be realistic in their demands if metal was as short as was indicated in the morning we did not feel it should be put towards increasing inventories. At that point because Mr. Coffin was at a loss to account for the sizable increase in inventory he called in their scheduling man Mr. Kehew. When I asked him the question as to what their actual needs for the period ahead without building stock, he indicated that 3,500,000 ft. would be adequate. I then stated that it would be helpful to both parties if they would review their requirements carefully and give us a revised estimate and that we would then check our production facilities and if we were able to give them any additional quantity we would so advise them. We did not consider it good practice on our part to have to run Saturdays and overtime to build stock for them which might mean reduced requirements in the near future as their over-estimates in inventory had done to us in the past. I indicated that on Neoprene insulating for the first nine months they had ordered an average of 2,760,000 feet per month and we had produced an average of 2,725,000 feet. On Polyethylene they had ordered 2,170,000 ft. average per month and we had produced 2,170,000 ft. average per month and on Triplex they had ordered 1,200,000 ft. average per month and that we had produced 1,320,000 ft. This indicates that with the heavy production in September we have brought ourselves up-to-date on their requirements despite sizable increases in demand.

[fol. 5132]. On the matter of their increased stock at Rome they stated that increases unfortunately were in less active sizes but they agreed to take prompt action on shipping sizable quantities to Massena,

I then asked them what their views were on entry into the building wire field. Mr. Coffin stated they had hired a special consultant in an electrical engineering firm in New York to make a full appraisal and study of the building wire question and give them a report on aluminum wire versus copper. He indicated that because of Kaiser's entry into this field and what he believed this report would show they might be coming to us to make aluminum building wire for them.

I then asked them about power cable. Phil Coffin being an old utility engineer stated this was a subject dear to his heart and that their salesmen were getting increasing inquiries about the possibility of their supplying power cable. He stated that they have kept away from the subject but they did not know how long they could, but this would require considerable study. I pointed out to them that expecting us to make either building wire, and particularly power cable, was something that could not be undertaken over night and that a full appraisal of the impact on our facilities and extent to which we would become involved was an important consideration for both companies.

A number of policy matters were discussed. I spoke a word for their joining the Wire & Cable Section of NEMA and Phil Coffin asked if we knew of any technical production man who might be anxious to be superintendent of their Massena plant.



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[fol. 5133] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 109

October 5, 1955.

To: Mr. Ralph V. Davies, Vice President  
Aluminum Company of America  
1501 Alcoa Building  
Pittsburgh 19, Pa.

Dear Ralph:

First, I again want to say that we appreciated Phil and you coming to Rome yesterday.

As in the past, while not having any formal contract I think it well to summarize briefly certain decisions and programs that we talked about so that unfortunate misunderstandings can be avoided in the future. I would appreciate it if after reading this letter, and having had an opportunity to talk with Phil about it, if you would advise me that you agree with the letter or at what points we are at variance.

If Rome had started looking a month ago, they could have obtained metal from K and R, both of whom were soliciting business up to about 9/1.

• First, we understand that you do not wish to be a 100% supplier of pig to us and now that we know this we will diligently endeavor to secure other sources. You agreed to supply us with 400,000 pounds of pig in October and 300,000 pounds in November. We did not settle on the exact December amount but my suggestion was that you try to give us 300,000 pounds and that we endeavor to get supplementary supplies to relieve your commitment of 300,000 pounds up to the extent of our ability to get 100,000 pounds between November and December, delivery to us. We understand that you will take care of us to the extent of 300,000 pounds per month for the first quarter of the calendar year 1956. We will also try to improve our supply position from other sources in that period.

No such understanding. We hope to help them to this extent.

In the discussion we stressed the importance to us of this transition period where we have not been on the books of other suppliers, because we had been getting 100% of our requirements from you. Our problem is compounded not only from the shortness of the overall supply of the metal and heavy backlogs in the hands of other suppliers but also because we will need lead time to experiment with quality of other suppliers' metal.

Should be good quality, based our past observations.

In the matter of your requirements from us, we understand that delivery of your first plastic extruder will not come until late Spring and the second machine in August and therefore you will be looking to us for full Polyethylene [fol. 5134] supply for the next eight or nine months and on large sizes of Triplex for a full year. You indicated that your requirements for Polyethylene would go steadily downward from late Spring and probably be ended by August or September of 1956.

We may have to lean on Rome indefinitely for fringe requirements.

You indicated that you had no present thoughts of doing any Neoprene insulating and the guess was made that it might be two to three years as the shortest time that you might even consider it and it would require additional time thereafter to get into production. We, therefore, are expecting and planning to supply your Neoprene insulating requirements at recent current levels of 3,000,000 to 3,500,000 feet per month. This is on a reservation basis. We will continue to twist all Neoprene insulated material.

We actually insulated well in excess of 5,000,000 feet of Neoprene in September. We stressed, however, the importance of getting any advance information on sizable increases because of limitations that could come up in compound mixing. Providing additional facilities for compound mixing might become a major capital expenditure with us, as well as a long lead time to get delivery of equipment, which emphasizes the importance of the second paragraph under 3. of the original memorandum of agreement between our two companies. In other words, if we have to acquire additional facilities that we be given the request so that we can advise you within 30 days as to

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decision to make such an investment and what sort of extension of period of the old agreement would be required.

We understand that you are studying and have studied the subject of building wire and that when your studies are more definitive that you may ask us to manufacture building wire, or decide to go into the manufacture yourself, but in any event you would advise us of your decision.

I also raised the question of your view on Power Cable and here again we were told that you had a considerable amount of interest being expressed by customers but that you would discuss the matter at some later date with us as to your feelings. We stressed the complications involved in getting into production of a product as complex as Power Cable and the further strain on our facilities if we should be asked to provide Power Cable for you without adequate planning and sufficient lead time. This matter affects not only our and your manufacturing but the engineering and training of sales departments for proper customer contact.

[fol. 5135] We discussed sizable stock of your product here at Rome and asked for some relief as it has been increased 50% in the last two months. With approximately 5,000,000 feet now of finished stock in Rome our storage facilities are being overly taxed and we hope that some of this can be shipped to Massena or direct to customers. We also stated our desire to cooperate with your need for increased quantities and it was agreed that you would review your actual immediate needs and we would endeavor to tell you how much additional we could take on towards reaching the inventory build-up that you felt necessary. We have certain reserve shifts on equipment but would only be desirous of opening these up if the demand warranted it for at least a two or three months period.

We discussed this on the plane. This was the result of misunderstanding in paper work.

I believe this outlines the major significant items and while I do not like long letters I feel that the discussions were of such importance to both companies that it is well to be sure that we have no misunderstandings. I am sending you an additional copy of the letter in case you want to give one to Phil Coffin.

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As always it was nice seeing you and we appreciate the effort you made to come to Rome.

With kindest regards.

Sincerely, ADRF, President.

ADRF/m

enc.

[fol. 5136] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 110

(Original of This Letter is Filed in Vault with Original Copy of Agreement)

Aluminum Company of America

Pittsburgh 19, Pa.

October 12, 1955.

Ralph V. Davies,  
Vice President.

Mr. A. D. R. Fraser, President,  
Rome Cable Corporation,  
Rome, New York.

Dear Ross:

This will refer to your letter of October 5 on which I probably should make a few comments.

First, in the third paragraph of your letter you relate your understanding that we will take care of you to the extent of 300,000 pounds of pig for the first quarter of the calendar year 1956. You may recall that when this subject was discussed Mr. Coffin pointed out that our books were not open for pig orders for the first quarter at this time. I think, therefore, it would be more proper to say that we hope to be able to help you to this extent.

In the fourth paragraph you comment on the quality of other supplier's metal for your needs. Based on past observations, we believe you will find the quality satisfactory.

The first paragraph on page 2, regarding polyethylene supply, might be amplified by the statement that we may count on Rome indefinitely for fringe requirements.

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Going now to the first paragraph on page 3 of your letter—Maybe your people have told you by now that the exceedingly large stock of finished material on hand at Rome was due to a misunderstanding connected with paper-work. This large stock was called to the attention of other [fol. 5137] members of our party while they were out in the plant and Mr. Coffin and I were told on the plane coming home that this misunderstanding was promptly corrected and shipments to alleviate the situation could be made.

Thanks for the courtesies extended to us on our visit and for the fine luncheon. We enjoyed our visit with you and your associates and had a pleasant return trip.

With best regards,

Sincerely yours, Ralph.

RVD:D

[fol. 5138] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 111

CC—G. A. Weiss

October 14, 1955.

Mr. Ralph E. Davies, Vice President,  
Aluminum Co. of America,  
Pittsburgh 19, Pa.

Dear Ralph:

I should have mentioned that the 300,000 pounds of pig per month for the first quarter of the calendar year 1956 was on the basis that you hoped to be able to help us to that extent.

We have been working overtime to get out the heavy specifications on stock shipments which we received after misunderstandings on paper work were cleared up.

In reading your comments on my letter of the 5th we are very pleased to know that our meeting of the 4th resulted in such complete accord of the matter covered in my letter.

With kindest regards.

Sincerely, —, —, President.

ADRF/m



[fol. 5139] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 112

cc: A. D. R. Fraser, S. O. Williams.

cc: Mr. R. Murray Willard, District Sales Manager, Aluminum Company of America, 90 State Street, Albany 7, N. Y.

October 21, 1955.

Mr. W. S. Stout,  
Aluminum Company of America,  
90 State Street,  
Albany 7, New York.

Dear Bill:

Stan has showed me your letter of October 14th, and we thought it best if I answered it as I have been doing the rounds of the aluminum suppliers.

When Ralph Davies was in Rome on October 4th we reviewed our requirements and indicated that we would endeavor to get on someone else's books as soon as possible. Since then I have talked with three suppliers and have been unable to get any aluminum pig prior to January 1st. They are also not ready to talk about the first quarter.

In view of the above we hope that our December orders from you will total 300,000 pounds. This is in line with Ross Fraser's letter to Ralph Davies on October 5th which stated as follows:

"We did not settle on the exact December amount but my suggestion was that you try to give us 300,000 pounds and that we endeavor to get supplementary supplies to relieve your commitment of 300,000 pounds up to the extent of our ability to get 100,000 pounds between November and December, delivery to us."

We have been unable to do this and, therefore, trust that you will be able to ship us the full 300,000 pounds.

In spite of the above, you may rest assured that we shall continue doing everything possible in order to get additional aluminum pig before the end of the year, but as

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we suspected this is the worst possible time for us to begin to swim.

Best regards.

Sincerely, —, —, Executive Vice President.

JHD:AS

[fol. 5140] IN UNITED STATES DISTRICT COURT

PLAINTIFF'S EXHIBIT 113

To: A. D. R. Fraser, R. A. Schatzel, S. O. Williams.  
From: J. H. Dyett.

Date: October 21, 1955.

Subject: Aluminum.

I am attaching copy of a letter sent to Mr. Glass of Anaconda. On October 18th I was talking with Mr. VanAlstyne; President of Aluminum Limited Sales who stated that they were extremely short of aluminum because of a landslide at Kitimat and lack of rain at their Saguenay property. He admitted that we were a good location and that they would get in touch with us as soon as they had anything available. He believed they were shipping some Boronized pig into this country but did point out that there might be some exploration of the tariff problems necessary.

Mr. Robert Belknap, New York Sales Manager of Kaiser appeared to be the most anxious to sell us. He did not think that they would have anything except rods prior to the first quarter. In respect to this period he will have to get in touch with us. He seemed most anxious for me to meet Mr. Inch when I was on the coast and indicated that perhaps something could be done out there.

The net result of my visita was to emphasize the scarcity of aluminum at the present time. Although no promises were made I do not believe it will be too many months before we can make at least a start with Kaiser. ALCAN and Anaconda will be much tougher to crack.

Jack.

Enc.

JHD:AS